LCD-Monitor

Chassis : LCL23ZS

Model : E2320
E2320X

SERVICE Manual

TFT-LCD Monitor

E2320 / E2320X

Contens

1. Precautions
2. Product specifications
3. Disassembly and Reassemble
4. Troubleshooting
5. Exploded View & Part List
6. Wiring Diagram

Refer to the service manual in the GSPN (see the rear cover) for the more information.

Contents

1. Precautions

1-1. Safety Precautions 1-1
1-2. Servicing Precautions 1-2
1-3. Static Electricity Precautions 1-2
1-4. Installation Precautions 1-3

2. Product specifications

2-1. Feature & Specifications 2-1
2-2. Spec Comparison to the Old Models 2-4
2-3. Accessories 2-6

3. Disassembly and Assembly

3-1. Disassembly 3-1

4. Troubleshooting

4-1. Troubleshooting 4-1
4-2. When the Power Does Not Turn On 4-2
4-3. When the screen is blank 4-4
4-4. Error Examples and Actions 4-8
4-5. Adjustment 4-9

5. Exploded View & Part List

5-1. Exploded View 5-1
5-2. Parts List 5-3

6. Wiring Diagram

6-1. Wiring Diagram - Main Board 6-1
6-2. Wiring Diagram - IP Board 6-4
6-3. Connector Functions 6-5
6-4. Cables 6-5

GSPN (Global Service Partner Network)

Area	Web Site
North America	http://service.samsungportal.com
Latin America	http://latin.samsungportal.com
CIS	http://cis.samsungportal.com
Europe	http://europe.samsungportal.com
China	http://china.samsungportal.com
Asia	http://asia.samsungportal.com
Mideast & Africa	http://mea.samsungportal.com

This Service Manual is a property of Samsung Electronics Co.,Ltd.
Any unauthorized use of Manual can be punished under applicable International and/or domestic law.

© 2010 Samsung Electronics Co.,Ltd.
All rights reserved.
Printed in Korea
P/N: BN82-00993A-00

3. Disassembly and Assembly

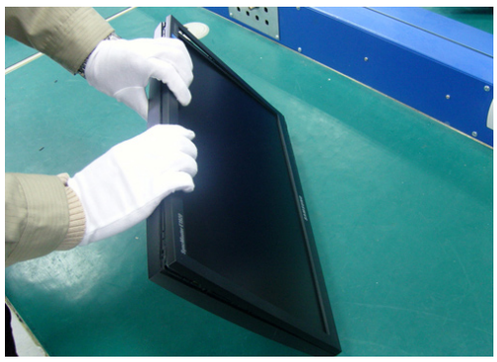
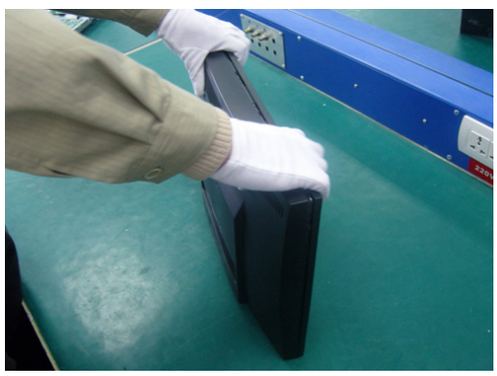
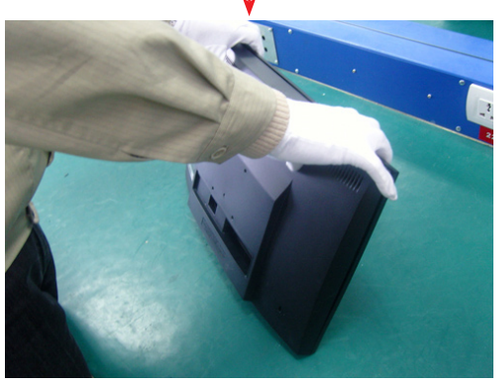
This section describes the disassembly and reassembly sequences for this monitor.

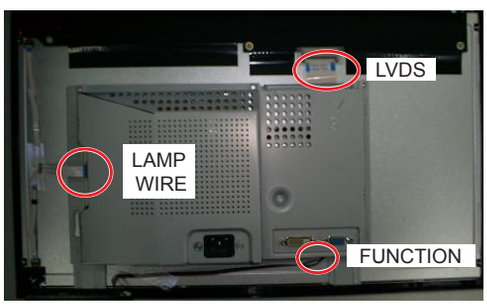
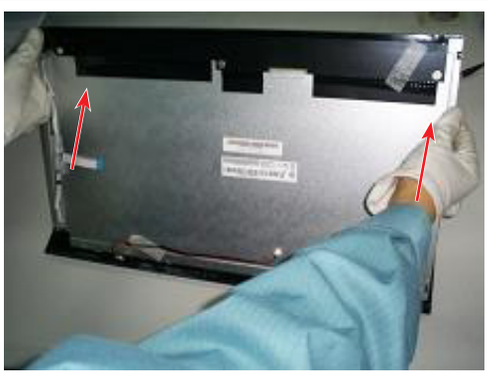
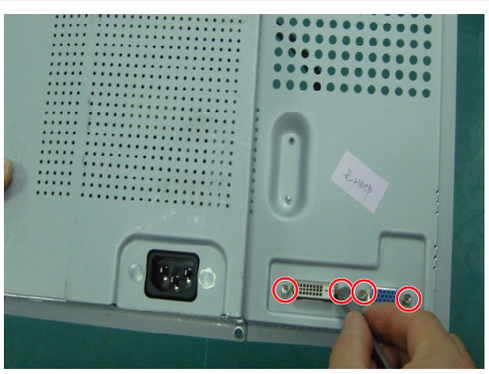
⚠ Warning: As this monitor has parts that are sensitive to static electricity, be careful when handling them.

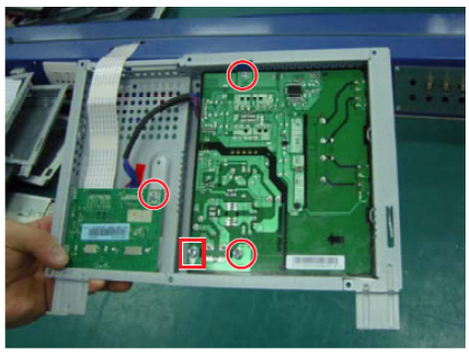
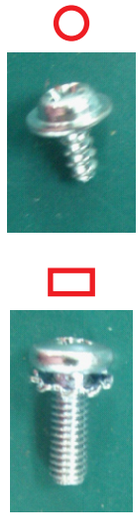
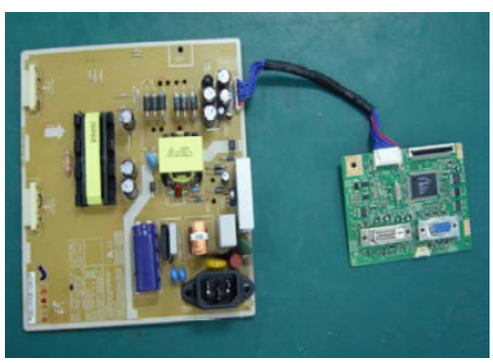
3-1. Disassembly

⚠ Caution: 1. Turn the monitor off before beginning the disassembly process.
2. When disassembling the monitor, do not use any metal tools except for the provided jig.
3. Disassemble the monitor carefully as directed in the following procedures.

Description	Photo	Screws
1. Remove the stand body.		
2. ① Turn the monitor over and insert your hands into the top of the monitor at the center and separate the front cover in the direction of the arrow as shown in the figure. ② Separate the sides of the front cover up to the directed line as shown in the figure.		

Description	Photo	Screws
3. Turn the monitor over again .	   	

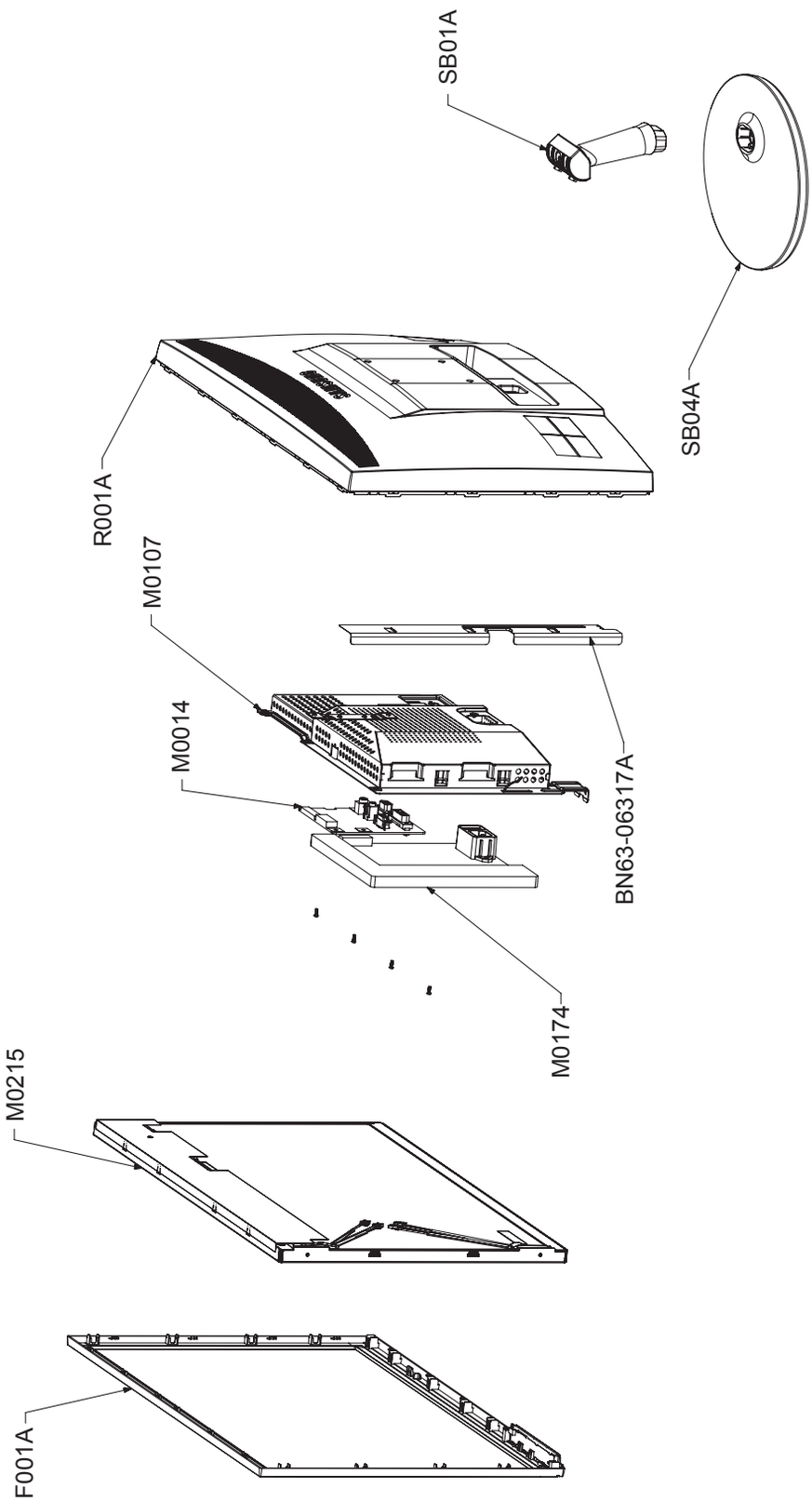
Description	Photo	Screws
4. Turn the monitor over again to remove the back cover.		
5. Remove the LVDS, LAMP wire and FUNCTION cable then remove the SHIELD-COVER.		
6. Remove the LCD panel.		
7. Remove the four (4) screws shown in the figure.		

Description	Photo	Screws
8. Remove the four (4) screws shown in the figure and remove the Bracket support.		
9. Remove the main PCB and IP boards from the SHIELD-cover.		

※The assembly is in the reverse order of disassembly.

5. Exploded View & Part List

5-1. LS23CLZSB/XF - Exploded View (E2320)



5-1-1. LS23CLZSB/XF - Parts List

Location No.	Code No.	Description & Specification	Q'ty	SA/SNA	Remark
F001A	BN96-13088B	ASSY COVER P-FRONT;E2320,ABS,HB,BK23,SIM	1	SA	
M0014	BN94-03397A	ASSY PCB MAIN-STZ;E2320,STZ	1	SA	
M0107	BN63-06316B	SHIELD-COVER;PLUM 23,SECC,T0.8,DUAL	1	SNA	
M0174	BN44-00323A	IP BOARD;PWI2304PC(A),PLUM23,23.6,24"w,0	1	SA	
M0215	BN07-00609A	LCD-PANEL;LTM230HT01,SSRZTS,6Bit + Hi-FR	1	SA	
R001A	BN96-13099A	ASSY COVER P-REAR;Cobalt E2320, E2320X,H	1	SA	
SB01A	BN96-12853A	ASSY STAND P-BODY;COBALT,HIPS,BK23,ETCH	1	SA	
SB04A	BN96-12977A	ASSY STAND P-BASE;COBALT ,19N,21.5~23,HI	1	SA	
	BN63-06317A	SHIELD-LAMP;PLUM 23",SPTE,T0.3	1	SNA	

5-2. LS23CLZSB/XF - Parts List (E2320)

Service Bom (**SA**: SERVICE AVAILABLE, **SNA**: SERVICE NOT AVAILABLE)

Level	Location No.	Code No.	Description & Specification	Q'ty	SA/SNA	Remark
0.1		BN90-02722A	ASSY COVER FRONT;E2320,BLACK	1	SNA	
..2	F001A	BN96-13088B	ASSY COVER P-FRONT;E2320,ABS,HB,BK23,SIM	1	SA	
...3	F001	BN63-06839B	COVER-FRONT;E2320,ABS,HB,BK23,ETCH , SIM	1	SNA	
...3	AL093	BN67-00281A	LENS-LED;Cobalt Project,PC CLEAR,TP26	1	SNA	
...3	M0007	BN64-01309A	KNOB-FUNCTION;Cobalt Project,ABS,BK23	1	SNA	
...3	FB01A	BN96-13682D	ASSY BOARD P-FUNCTION;Cobalt,FUNCTION,25	1	SA	
....4		BN94-03497C	ASSY PCB FUNCTION-BN96-13682D;COBALT,BN9	1	SNA	
.....5		0202-001463	SOLDER-WIRE;LFC2-W3.0,-,D3,99.79Sn/0.2Cu	1.814	SNA	
.....5		0202-001608	SOLDER-WIRE FLUX;LFC7-107,D0.8,99.3Sn/0.	0.003	SNA	
.....5		0204-002420	SOLVENT;1M-1000,C3H70H,96	3.47	SNA	
.....5		0204-002607	FLUX;DF-234U,13%,14KG,Gravity 0.82	2.259	SNA	
.....5	M2893	BN39-01298C	LEAD CONNECTOR;COBALT,UL1061#28,UL/CSA,5	1	SNA	
.....5	T0174	BN97-04306A	ASSY SMD;COBALT, FUNCTION	1	SNA	
......6		0202-001477	SOLDER-CREAM;LST309-M,D20~45um,96.5Sn/3A	0.462	SNA	
......6	L0405	0601-001896	LED;SMD,BLUE,1.6x0.8x0.4mm,470,1.6x0.8x0	1	SA	
......6	AHR40	2007-000088	R-CHIP;7.5Kohm,5%,1/10W,TP,1608	2	SNA	
......6	KAR11	2007-000124	R-CHIP;2.2Kohm,5%,1/10W,TP,1608	2	SNA	
......6	T0313	3404-001379	SWITCH-TACT;12V,50mA,250gf,4.9x4.9x1.5mm	6	SA	
......6	HB01A	3711-005743	HEADER-BOARD TO CABLE;BOX,5P,1R,1.25mm,A	1	SA	
......6		BN41-01400B	PCB SUB-FUNCTION;Cobalt(all),FR-4,2,1.1,	1	SNA	
...3		BN68-02382B	LABEL-TCO5.0,ENERGY-STAR;TCO5.0,ENERGY-S	1	SNA	
0.1	R001A	BN90-02723A	ASSY COVER REAR;E2320,BLACK,texture	1	SNA	
..2	R001A	BN96-13099A	ASSY COVER P-REAR;Cobalt E2320, E2320X,H	1	SA	
...3	W391	6003-000275	SCREW-TAPTYPE;BH,+,B,M3,L10,ZPC(BLK),SWR	2	SA	
...3	M0113	BN61-01581A	BRACKET-VESA;BI17/19BS,SECC,T1.0	2	SNA	
...3	T0060	BN61-05331A	SPRING ETC;LAVENDER 23",SK5,T0.5	1	SNA	
...3	CIS4	BN61-05332A	HOLDER-STAND;LAVENDER 23",ACETAL,WHITE	1	SNA	
...3	M0111	BN63-05625A	COVER-STAND;LAVENDER 23W,BK23	1	SNA	
...3	R001	BN63-06846A	COVER-REAR;Cobalt E2320, E2320X,,HIPS,HB	1	SNA	
...3		BN96-13761A	ASSY SHIELD P-LAMP;Cobalt 23" 24",STPE,T	1	SNA	
....4		BN63-06317A	SHIELD-LAMP;PLUM 23",SPTE,T0.3	1	SNA	
....4	M0131	BP63-00786A	GASKET;HLS6187WX/XAA,Conductive Adhesive	1	SNA	
0.1		BN91-02922A	ASSY LCD;LTM230HT01,Cream-MFM 23"	1	SNA	
..2	M0215	BN07-00609A	LCD-PANEL;LTM230HT01,SSRZTS,6Bit + Hi-FR	1	SA	
0.1	M0017	BN91-05223K	ASSY CHASSIS-STZ;E2320	1	SNA	
..2	M0174	BN44-00323A	IP BOARD;PWI2304PC(A),PLUM23,23.6,24"w,0	1	SA	
..2	M0014	BN94-03397A	ASSY PCB MAIN-STZ;E2320,STZ	1	SA	
...3		0202-001463	SOLDER-WIRE;LFC2-W3.0,-,D3,99.79Sn/0.2Cu	1.558	SNA	
...3		0202-001608	SOLDER-WIRE FLUX;LFC7-107,D0.8,99.3Sn/0.	0.003	SNA	

Level	Location No.	Code No.	Description & Specification	Q'ty	SA/SNA	Remark
...3		0204-002420	SOLVENT;1M-1000,C3H70H,96	3.47	SNA	
...3		0204-002607	FLUX;DF-234U,13%,14KG,Gravity 0.82	2.259	SNA	
...3		3701-001510	CONNECTOR-DSUB;15P,3R,FEMAIL,STAMPED PIN	1	SNA	
...3	EC05	3701-001666	CONNECTOR-DVI;24P,3ROW,FEMALE,STARAIGHT,	1	SA	
...3	CN906	3711-005847	CONNECTOR-HEADER;BOX,9P,1R,2MM,ANGLE,SN,	1	SNA	
...3		BN97-00707A	ASSY HDCP;BN46-00018A,BR20/21BS_CS,MSTAR	1	SNA	
....4		BN46-00018A	KEY CODE-CERTIFICATE;(HDCP KEY) PPM42M5S,	1	SNA	
...3		BN97-04137A	ASSY SMD;E2320,STZ,BN94-03397A	1	SNA	
....4		0202-001477	SOLDER-CREAM;LST309-M,D20~45um,96.5Sn/3A	0.795	SNA	
....4	DS01A	0401-001056	DIODE-SWITCHING;MMBD4148SE,100V,200mA,SO	11	SA	
....4	DR01A	0402-001614	DIODE-RECTIFIER;S1G,400V,1A,DO-214AC,TP	1	SA	
....4	MZD1	0403-001411	DIODE-ZENER;5.49-5.73V,200mW,SOD-323,TP	10	SA	
....4		0403-001712	DIODE-ZENER;QZX363C6V8,6.47/7.14V,200mW,	2	SNA	
....4	Q101	0501-000445	TR-SMALL SIGNAL;KTC3875S-Y,NPN,150mW,SOT	1	SA	
....4	PQ02	0501-002080	TR-SMALL SIGNAL;2SC2412K,NPN,200mW,SC-59	3	SA	
....4	Q409	0505-001165	FET-SILICON;Si3443CDV,P,-20V,+-4.4A,65mo	1	SA	
....4	ND51C2	1001-001155	IC-ANALOG MULTIPLEX;NC7SB3157P6X,CMOS,SC	1	SA	
....4	IC112	1103-000129	IC-EEPROM;24C02,2Kbit,256x8,SOP,8P,5x4mm	2	SA	
....4	IC112	1103-001410	IC-EEPROM;S-24CS08AFJ-TB-1GE,8Kbit,1Kx8,	1	SA	
....4	T0087	1203-006118	IC-POSI.FIXED REG.;S-1172B18-U5T1G,SOT-8	1	SA	
....4	T0087	1203-006141	IC-POSI.FIXED REG.;S-1172B33-U5T1G,SOT-8	1	SA	
....4	IC109	1205-003894	IC-LCD CONTROLLER;SE959LMH-LF,PQFP,128P,	1	SA	
....4	DR1	2007-000043	R-CHIP;1Kohm,1%,1/10W,TP,1608	5	SA	
....4	KAR21	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SNA	
....4	CER02	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	12	SNA	
....4	AR30	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	19	SA	
....4	AVR51	2007-000083	R-CHIP;3Kohm,5%,1/10W,TP,1608	2	SNA	
....4	CER04	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	3	SA	
....4	MROP1	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	22	SA	
....4	AR108	2007-000097	R-CHIP;47Kohm,5%,1/10W,TP,1608	7	SA	
....4	ARR2	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	2	SA	
....4	MR112	2007-000309	R-CHIP;10ohm,5%,1/10W,TP,1608	2	SA	
....4	HR13	2007-000821	R-CHIP;390ohm,1%,1/10W,TP,1608	2	SNA	
....4	WR15B	2007-001044	R-CHIP;56ohm,5%,1/10W,TP,1608	2	SA	
....4	ZR10	2007-001164	R-CHIP;75ohm,1%,1/10W,TP,1608	3	SNA	
....4	R1	2007-002425	R-CHIP;1ohm,5%,1/10W,TP,1608	5	SNA	
....4		2007-007720	R-CHIP;300Kohm,1%,1/10W,TP,1608	1	SA	
....4	C258	2203-000236	C-CER,CHIP;0.1nF,5%,50V,C0G,1608	3	SA	
....4	C134	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
....4	ZC14	2203-000626	C-CER,CHIP;0.022nF,5%,50V,C0G,1608	3	SNA	
....4	AAC14	2203-000888	C-CER,CHIP;4.7nF,10%,50V,X7R,TP,1608	6	SA	
....4	DC108	2203-005005	C-CER,CHIP;100nF,10%,16V,X7R,1608	47	SC	
....4	PC11	2203-006141	C-CER,CHIP;1000nF,10%,16V,X5R,1608	3	SNA	

Level	Location No.	Code No.	Description & Specification	Q'ty	SA/SNA	Remark
....4	C125	2203-006361	C-CER,CHIP;10000nF,10%,10V,X5R,TP,2012	18	SC	
....4	X202	2801-003667	CRYSTAL-SMD;14.31818MHz,30ppm,28-AAN,16p	1	SA	
....4	L2011	3301-001145	BEAD-SMD;60ohm,4516,TP,70ohm/45MHz,82ohm	4	SNA	
....4	T0568	3301-001407	BEAD-SMD;30ohm,1608,300mA,TP,,,0.4ohm	2	SNA	
....4	AC510	3708-001150	CONNECTOR-FPC/FFC/PIC;30P,1mm,SMD-A,SN,Y	1	SA	
....4	HB01A	3711-005743	HEADER-BOARD TO CABLE;BOX,5P,1R,1.25mm,A	1	SA	
....4	KAR11	2007-000124	R-CHIP;2.2Kohm,5%,1/10W,TP,1608	1	SNA	
....4	C3	2203-000384	C-CER,CHIP;0.015nF,5%,50V,C0G,1608	1	SNA	
....4		BN97-03976J	ASSY MICOM;B2340,STZ,BN94-03250J	1	SNA	
.....5	IC115	1107-001580	IC-FLASH MEMORY;MX25L4005,4Mbit,512Kx8,S	1	SNA	
....4		BN41-01311C	PCB MAIN;PLUM B2330,CEM-3,2,MP1.0,1.6,91	1	SNA	
..2	M0214	BN96-02854Y	ASSY CABLE P-FLAT;Mckinley,Flat cable,17	1	SA	
..2	M0006	BN96-12459B	ASSY SHIELD P-COVER;PLUM 23,SECC,T0.8,DU	1	SNA	
...3		BN61-05973A	STUD-PEM;PLUM23",M4,D8,L20	2	SNA	
...3	M0107	BN63-06316B	SHIELD-COVER;PLUM 23,SECC,T0.8,DUAL	1	SNA	
...3	M0131	BN63-00049A	GASKET;RB17AS,Conductive Fabric,1.5MM,10	1	SNA	
...3	M0114	BN61-02500A	HOLDER-WIRE;NYLON6.6,NATURAL	1	SNA	
..2	T0081	6001-002408	SCREW-MACHINE;BH,+,WT,M4,L12,ZPC(WHT),SW	2	SA	
..2	M0081	6003-000264	SCREW-TAPTYPE;PWH,+,-,B,M3,L6,ZPC(WHT),S	2	SA	
0.1		BN91-05280A	ASSY SHIELD;E2320X	1	SNA	
..2	CIS1	BN74-00021A	TAPE-FILAMENT;Filament tape,clear,#8915,	0.3	SNA	
0.1		BN92-05486D	ASSY LABEL;Cobalt, BLACK	1	SNA	
..2	CCM1	BN68-01570A	LABEL RATING;ALL,SS,PE,T0.05,90,45,Dark	1	SNA	
0.1		BN92-05547X	ASSY P/MATERIAL;S23S1,LS23CLZSB/EN	1	SNA	
..2	T0214	0203-001595	TAPE-OPP MASKING;OPP-2,0.075,75,800M,CLR	1.54	SNA	
..2		6902-000061	BAG AIR;LDPE,T0.2,W500,L1000,TRP,370.000	1	SNA	
..2		6902-000379	BAG AIR;LDPE,T0.2,W1000,L1800,TRP,1260.0	1	SNA	
..2	T0524	6902-000520	BAG PE;HDPE/NITRON,T0.015/T0.5(DOUBLE),W	1	SNA	
..2		6902-000604	BAG WRAPPING;LDPE,T0.02,W500,L10000,TRP,	2.47	SNA	
..2		6902-000609	BAG ROLL;LDPE,T0.05,W2400,L1000,TRP,30.0	0.02	SNA	
..2		AA69-03810M	PAD-PLATE;CB,SW,1240,800	1	SNA	
..2	T0527	BH68-40364A	LABEL-SUMMARY;G52,G72,ART,100G,WHT,BLK,W	1	SNA	
..2		BH69-00457C	PACKING INNER-00,PAD;COMM,OTHER,T3.0,880	1	SNA	
..2	T0527	BN68-00129A	LABEL SHIPPING-00;LABEL SHIPPING,ART-PAP	1	SNA	
..2		BN69-00391Y	PAD-ANGLE;CB,T5,W2100,L50,YEL,403g	1	SNA	
..2		BN69-03507F	PALLET-WOOD;F2380,WOOD-OTH,W1265,D835,H1	1	SNA	
..2		BN69-04627A	CUSHION-SET;COBALT23",SIMPLE,EPS,T0.018,	1	SNA	
0.1		BN92-05761V	ASSY BOX;LS23CLZSB/XF	1	SNA	
..2	T0077	BH68-00329D	LABEL BAR CODE-02;NO CE,NO WT`Y,MPRII,LA	1	SNA	
..2		BN68-02258M	LABEL-STICKER HIC;MODEL9,CHINA,MOJO,80G,	1	SNA	
..2		BN69-04816A	BOX-02,SET;Cobalt23"(SIMPLE),PAPER,SW,A1	1	SNA	

Level	Location No.	Code No.	Description & Specification	Q'ty	SA/SNA	Remark
..2		BH68-00659H	LABEL BOX-00;ALL MODEL,MOJO 90G,90,95,WH	1	SNA	
0.1	ACCE1	BN92-05913M	ASSY ACCESSORY;LS22CLZSB/XF	1	SNA	
..2	EC29	BN39-00244H	CBF SIGNAL-D-SUB TO D-SUB;D-sub cable,15	1	SA	
..2	SB01A	BN96-12853A	ASSY STAND P-BODY;COBALT,HIPS,BK23,ETCH	1	SA	
...3	W392	6003-000282	SCREW-TAPTYPE;BH,+,-,B,M3,L8,ZPC(BLK),SW	2	SA	
...3	T0524	6902-000023	BAG PE;LDPE,T0.08,W150,L120,TRP,1.650g	1	SNA	
...3		BN61-06067A	STAND-BAR;COBALT 21.5,HIPS,BK23	1	SNA	
....4		BN61-06068A	STAND-BAR IN;COBALT,HIPS,BK23,IN	1	SNA	
...3		BN61-06334A	BRACKET-PLATE;COBALT,SECC,1.0,SIMPLE	1	SNA	
...3		BN68-02822J	LABEL-STICKER;W/W,ART PAPER,T0.05,50,10,	1	SNA	
..2	SB04A	BN96-12977A	ASSY STAND P-BASE;COBALT ,19N,21.5~23,HI	1	SA	
...3	M0081	6003-001001	SCREW-TAPTYPE;FH,+,B,M3,L8,ZPC(BLK),SW RC	4	SNA	
...3	T0524	6902-000109	BAG PE;HDPE,T0.015,W350,L430,TRP,28,2,4.	1	SNA	
...3	CIS4	BN61-01717A	HOLDER-STAND;BIZET,NI PLT,CH,+,M4,L11(5)	1	SNA	
...3		BN61-05087A	BRACKET-STAND BOTTOM;ECOFIT 23",SECC T0.	1	SNA	
...3		BN63-06779A	COVER-STAND BASE;COBALT 19N,21.5~24,HIPS	1	SNA	
...3	AR011	BN73-00077A	RUBBER FOOT;MATISSE,BUMPON,#13.5,T2.0 ,60	6	SNA	
...3		BN68-02691A	MANUAL FLYER-STAND;COBALT,Mojo 80g,148,2	1	SNA	
...3		BN68-02822H	LABEL-STICKER;W/W,ART PAPER,T0.05,50,10,	1	SNA	
..2	ACCE1	BN96-13553D	ASSY ACCESSORY;LS19CLNSB/XF	1	SA	
...3	T0268	3903-000455	CBF-POWER CORD;DT,CN,IP3/Y(A),IEC320 C13	1	SA	
...3	T0524	6902-000110	BAG PE;LDPE,T0.05,W250,L400,TRP,28,2,9.2	1	SNA	
...3	T0527	AA68-00764A	LABEL-PASSING;SAMSUNG ALL,ART PAPER,CLR,	1	SNA	
...3	T0527	BN68-00513A	LABEL-E,PASS;ALL MODEL,YUPO(110G),50X15,	1	SNA	
...3		BN68-01789A	MANUAL FLYER-WARRANTY CARD;Chinese,Art 1	1	SNA	
...3		BN68-02528A	MANUAL FLYER-CHINA MANUAL;Cobalt,SyncMas	1	SNA	
...3		BN68-01118D	MANUAL-TCO 5.0 CARD;COMM,W/W,Mojo 80g,21	1	SNA	

1. Precautions

1-1. Safety Precautions

Follow these safety, servicing and ESD precautions to prevent damage and to protect against potential hazards such as electrical shock.

1-1-1. Warnings

1. For continued safety, do not attempt to modify the circuit board.
2. Disconnect the AC power and DC power jack before servicing.

1-1-2. Servicing the LCD Monitor

1. When servicing the LCD Monitor, Disconnect the AC line cord from the AC outlet.
2. It is essential that service technicians have an accurate voltage meter available at all times. Check the calibration of this meter periodically.

1-1-3. Fire and Shock Hazard

Before returning the monitor to the user, perform the following safety checks:

1. Inspect each lead dress to make certain that the leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the monitor.
2. Inspect all protective devices such as nonmetallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistorcapacitor networks, mechanical insulators, etc.
3. Leakage Current Hot Check (Figure 1-1):
   WARNING : Do not use an isolation transformer during this test.
   Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI C101.1, Leakage Current for Appliances), and Underwriters Laboratories (UL Publication UL1410, 59.7).

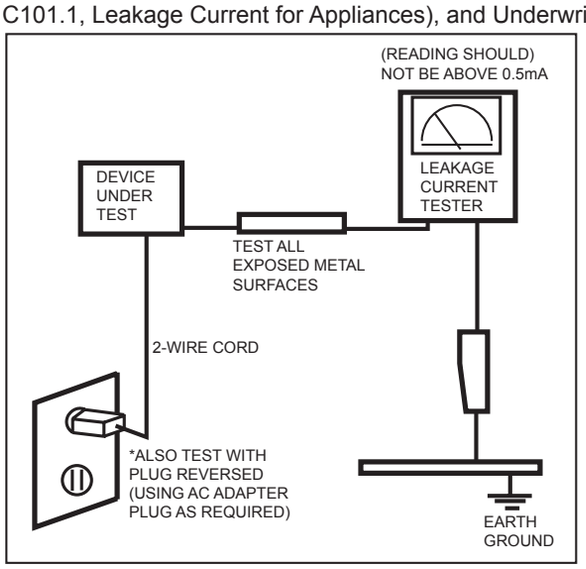


Figure 1-1. Leakage Current Test Circuit

4. With the unit completely reassembled, plug the AC line cord directly into a 120V AC outlet. With the unit's AC switch first in the ON position and then OFF, measure the current between a known earth ground (metal water pipe, conduit, etc.) and all exposed metal parts, including: metal cabinets, screwheads and control shafts.
   The current measured should not exceed 0.5 milliamp.
   Reverse the power-plug prongs in the AC outlet and repeat the test.

1-1-4. Product Safety Notices

Some electrical and mechanical parts have special safetyrelated characteristics which are often not evident from visual inspection. The protection they give may not be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by ⚠ on schematics and parts lists. A substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire and/or other hazards. Product safety is under review continuously and new instructions are issued whenever appropriate.

1-2. Servicing Precautions

WARNING: An electrolytic capacitor installed with the wrong polarity might explode.
Caution: Before servicing units covered by this service manual, read and follow the Safety Precautions section of this manual.
Note: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions, always follow the safety precautions.

1-2-1 General Servicing Precautions

1. Always unplug the unit's AC power cord from the AC power source and disconnect the DC Power Jack before attempting to:
   (a) remove or reinstall any component or assembly, (b) disconnect PCB plugs or connectors, (c) connect a test component in parallel with an electrolytic capacitor.
2. Some components are raised above the printed circuit board for safety. An insulation tube or tape is sometimes used. The internal wiring is sometimes clamped to prevent contact with thermally hot components. Reinstall all such elements to their original position.
3. After servicing, always check that the screws, components and wiring have been correctly reinstalled. Make sure that the area around the serviced part has not been damaged.
4. Check the insulation between the blades of the AC plug and accessible conductive parts (examples: metal panels, input terminals and earphone jacks).
5. Insulation Checking Procedure: Disconnect the power cord from the AC source and turn the power switch ON. Connect an insulation resistance meter (500 V) to theblades of the AC plug.
   The insulation resistance between each blade of the AC plug and accessible conductive parts (see above) should be greater than 1 megohm.
6. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the positive lead; always remove the instrument's ground lead last.

1-3. Static Electricity Precautions

Some semiconductor (solid state) devices can be easily damaged by static electricity. Such components are commonly called Electrostatically Sensitive Devices (ESD). Examples of typical ESD are integrated circuits and some field-effect transistors. The following techniques will reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor components or assemblies, drain the electrostatic charge from your body by touching a known earth ground. Alternatively, wear a discharging wrist-strap device. To avoid a shock hazard, be sure to remove the wrist strap before applying power to the monitor.
2. After removing an ESD-equipped assembly, place it on a conductive surface such as aluminum foil to prevent accumulation of an electrostatic charge.
3. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESDs.
4. Use only a grounded-tip soldering iron to solder or desolder ESDs.
5. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ESDs.
6. Do not remove a replacement ESD from its protective package until you are ready to install it. Most replacement ESDs are packaged with leads that are electrically shorted together by conductive foam, aluminum foil or other conductive materials.
7. Immediately before removing the protective material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   Caution: Be sure no power is applied to the chassis or circuit and observe all other safety precautions.
8. Minimize body motions when handling unpackaged replacement ESDs. Motions such as brushing clothes together, or lifting your foot from a carpeted floor can generate enough static electricity to damage an ESD.

1-4. Installation Precautions

1. For safety reasons, more than two people are required for carrying the product.
2. Keep the power cord away from any heat emitting devices, as a melted covering may cause fire or electric shock.
3. Do not place the product in areas with poor ventilation such as a bookshelf or closet. The increased internal temperature may cause fire.
4. Bend the external antenna cable when connecting it to the product. This is a measure to protect it from being exposed to moisture. Otherwise, it may cause a fire or electric shock.
5. Make sure to turn the power off and unplug the power cord from the outlet before repositioning the product. Also check the antenna cable or the external connectors if they are fully unplugged. Damage to the cord may cause fire or electric shock.
6. Keep the antenna far away from any high-voltage cables and install it firmly. Contact with the highvoltage cable or the antenna falling over may cause fire or electric shock.
7. When installing the product, leave enough space (10cm) between the product and the wall for ventilation purposes. A rise in temperature within the product may cause fire.

Memo

2. Product specifications

2-1. Feature & Specifications

Model	E2320 / E2320X
Feature	
▶ Panel Specifications: 300 cd/m2, 5 ms, CR 1000:1, 170/160 (CR>10) ▶ DPMS : <0.3W ▶ Off-Timer function for reducing standby power usages ▶ Windows Vista/Win 7 authentication ▶ DVI with HDCP (wide model) ▶ Picture;a screen size desire ▶ Supported Magic Bright3/Maigc Eco/Magic Angle/Magic Return off timer/Image Size/Color Effect/Key Repeat Time	

Specifications	
Item	**Description**
LCD Panel	TFT-LCD panel, RGB vertical stripe, normally white transmissive,
	23” Wide viewable 0.2655(H)x0.2655(V)mm pixel pitch
Scanning Frequency	Horizontal : 30kHz ~ 81kHz (Automatic) Vertical: 56Hz ~ 75Hz
Display Colors	16.7 Million colors
Maximum resolution	Horizontal: 1920 Pixels Vertical: 1080 Pixels
Input Signal	Analog / DVI digital with HDCP
Input Sync Signal	Seperate H/V sync, Composite H/V, Sync-on-Green Level: TTL level
Maximum Pixel Clock rate	164Mhz
Active Display (Horizontal/Vertical)	509.76(H) x 286.741(V)
AC power voltage & Frequency	AC 100V~130V, 60Hz & AC, 200V~240V 50Hz
Power Consumption	MAX 50W / Typical 45W
Dimensions Set (W x D x H)	551 x 330.6 x 62 mm (Without Stand) 551 x 410.5 x 200 mm (With Stand)
Weight (Set/Package)	Set : 4.35kg (Without Stand) 4.75kg (With Stand)
Environmental Considerations	Operating Temperature: 10˚C ~ 40˚C(50˚F ~ 104˚F) Operating Humidity : 10% ~ 80% Operating Temperature: -20˚C ~ 45˚C(-4˚F ~ 113˚F) Operating Humidity: 5% ~ 95%
Note: Designs and specifications are subject to change without prior notice.	

2-2. Spec Comparison to the Old Models

Model	Cobalt (E2320 / E2320X)	Mckinley 16:9 (2243SW)
Design		
Resolution	1920x1080	1920x1080
Input	Analog / DVI digital with HDCP	Analog / DVI digital with HDCP
Response Time	5ms(W to B)	5ms(W to B)
Viewing Angle	170/160(CR>10)	170/160(CR>10)
Brightness	300 cd/m²	300 cd/m²
Contrast	**70000:1(DCR)**	15000:1(DCR)
MagicBright	**5 Step**	7 Step
Feature	**MagicBright3** **MagicEco** **MagicAngle** **MagicReturnOff timer** **Image Size** **Color Effect** **Key Repeat Time** **Windows7** **DVI with HDCP** **Customized key**	Magic Color Color Effect Image Size Magic Bright2 Magic Tune (Premium)

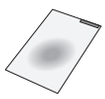
*Color Effect
- Grey scale: Images are displayed in a grey tone on the screen.
- Green: Images are displayed in a green tone on the screen.
- Aqua: Images are displayed in a blue tone on the screen.
- Sepia: Images are displayed in a brown tone on the screen.

Image Size : If the resolution is not wide resolution, this option allows the screen size to be selected as normal or wide.

*Magic Angle
- Lean Back Mode1: Select when viewing from a slightly lower angle.
- Lean Back Mode2: Select when viewing from the bottom.
- Standing Mode: Select when viewing from the top.
- Side Mode: Select when viewing from the left or right.
- Custom: When <Custom> is selec ted, settings for <Lean Back Mode 1> is applied by default.
  User can set suitable picture quality as needed.

*Magic Eco
- 100%: the power consumption is 100% of Default Setting.
- 75%: the power consumption is 75% of Default Setting.
- 50%: the power consumption is 50% of Default Setting.

2-3. Accessories

Product	Description	Code. No	Remark
	Quick Setup Guide	BN68-02508A	Samsung Electronics Service center
	Warranty Card (Not available in all locations)	BN68-00226R	
	User's Guide, Monitor Driver, Natural Color Pro Software	BN59-00990A	
	D-Sub(15 Pin) Cable	BN39-00244G	
	Power Cord	3903-000452	

2-4. Accessories (Sold separately)

Product	Description	Code. No	Remark
	DVI Cable	BN39-00246K	Samsung Electronics Service center

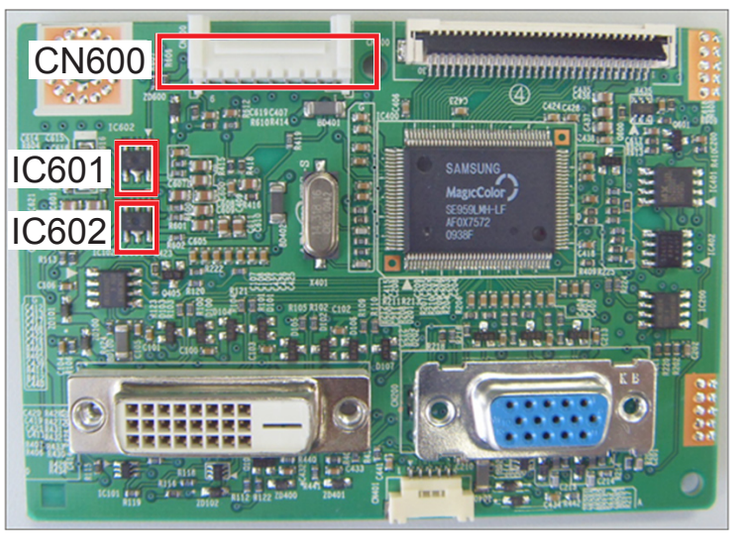
Memo

4. Troubleshooting

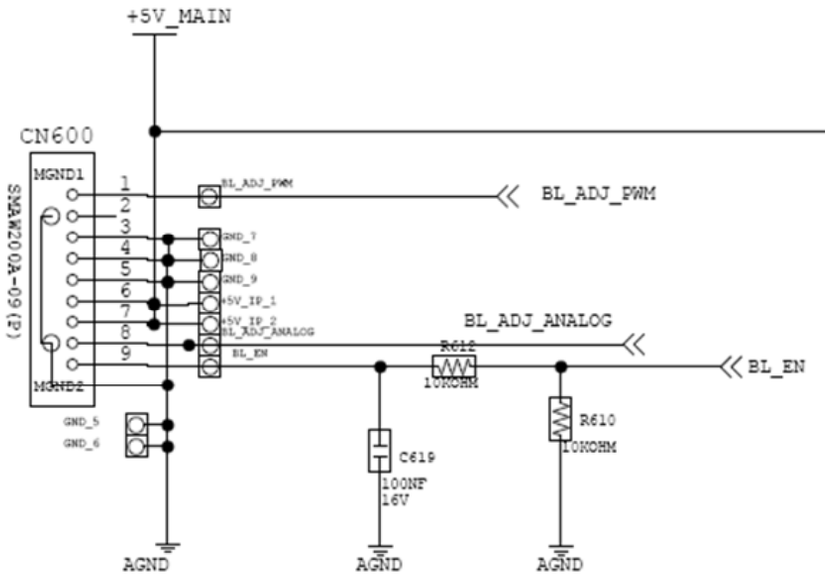
4-1. Troubleshooting

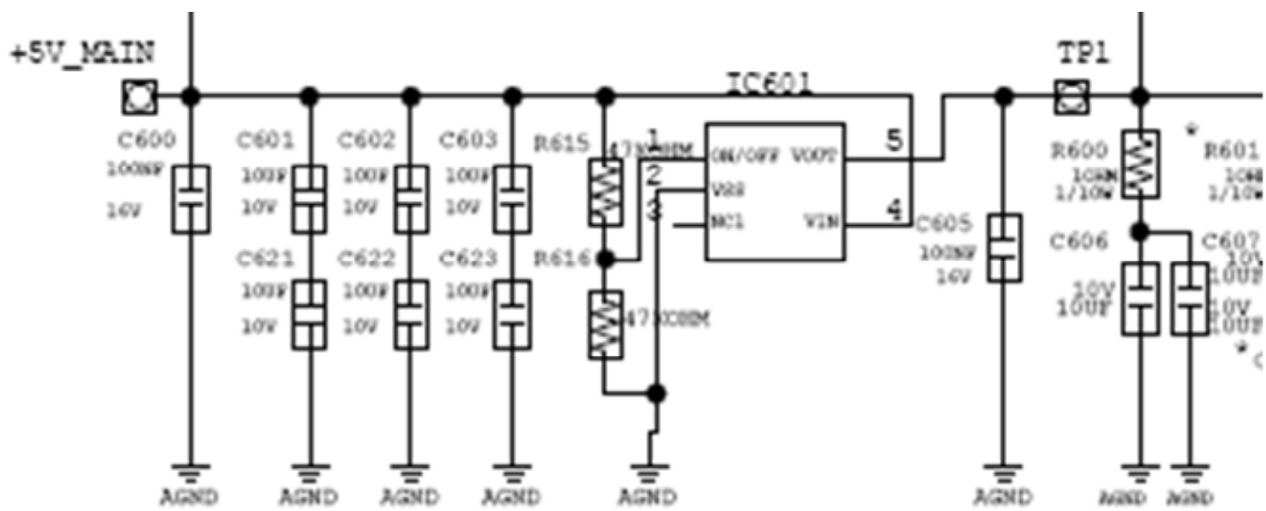
1. Set custom mode as follows before beginning a repair.
   • Resolution: 1920x1080
   • H-frequency: 65kHz
   • V-frequency: 60 Hz
2. If the screen is blank, check whether the power cord is connected correctly.
3. The circuits to check:
   • When the raster does not appear: The Function PCB, Main PCB, I/P PBA
   • When 5V is generated but a blank screen is displayed: Main PCB
   • When 5V is not generated: I/P PBA
4. “Press the MENU button and hold down the, “↵ (Enter, Source)” button for more than five (5) seconds to return the monitor to factory mode.

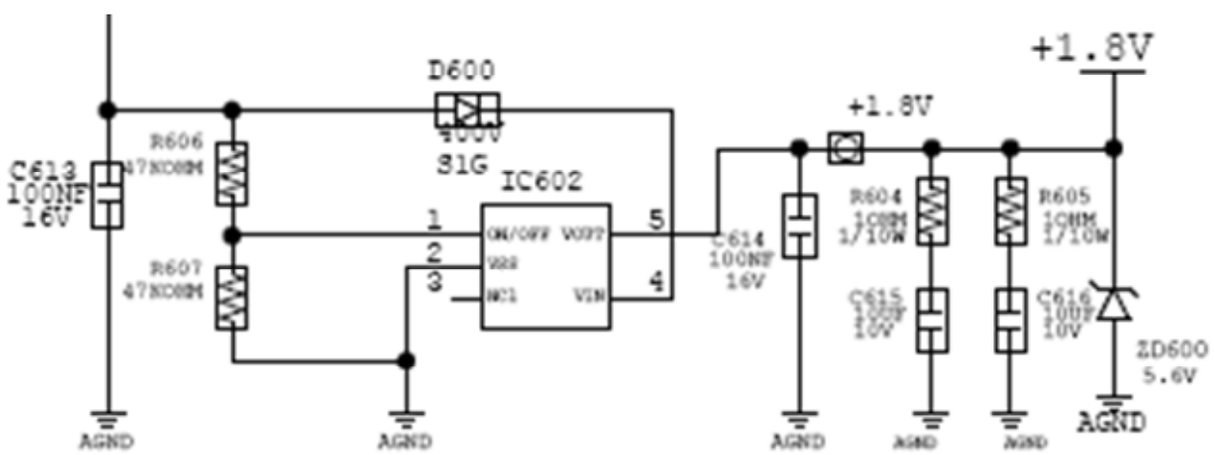
4-2. When the Power Does Not Turn On

Symptom	- When turning on the Power button after connecting the power cable, the LED at the front of the monitor does not operate.
Major checkpoints	- When turning on the Power button after connecting the power cable, the LED at the front of the monitor does not operate. - Check the IP board power fuse and the IP board output power. - Check the connections for the IP board and the Main board inside the monitor. - Check the Main board power part and also check whether there is any abnormal output at any of the other output terminals.
Diagnostics	 Yes → Check the connection status for the function assy. Is DC 5V measured at pins 5, 6 of the CN600 connector when pins 3, 4 are 0V? — No → Replace the IP board. Yes IIs DC 3.3V measured at pin 3 of IC601 when pin 1 is DC 5V? — No → Check the circuits related to IC601. Yes Is DC 1.8V measured at pin 2 of IC602 when pin 3 is DC 5V? — No → Check the circuits related to IC602. Yes Check and replace the IP board.
Caution	Make sure to disconnect the power before working on the IP board.

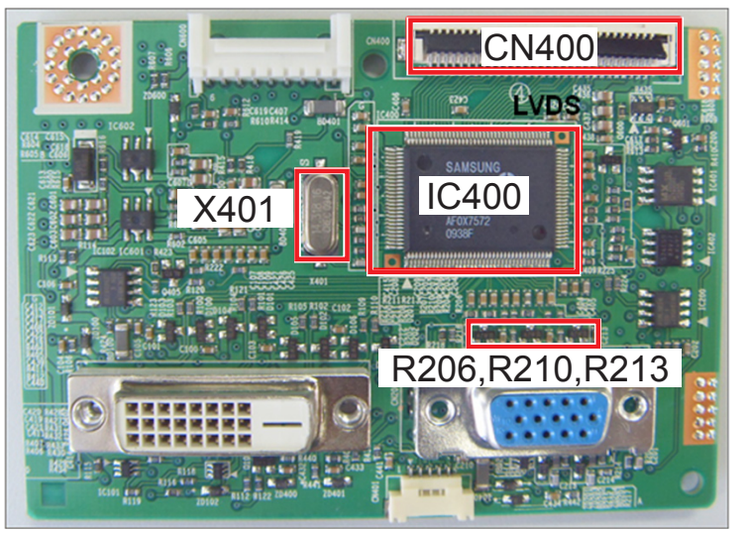
4-2-1. Circuit diagrams when the power does not turn on



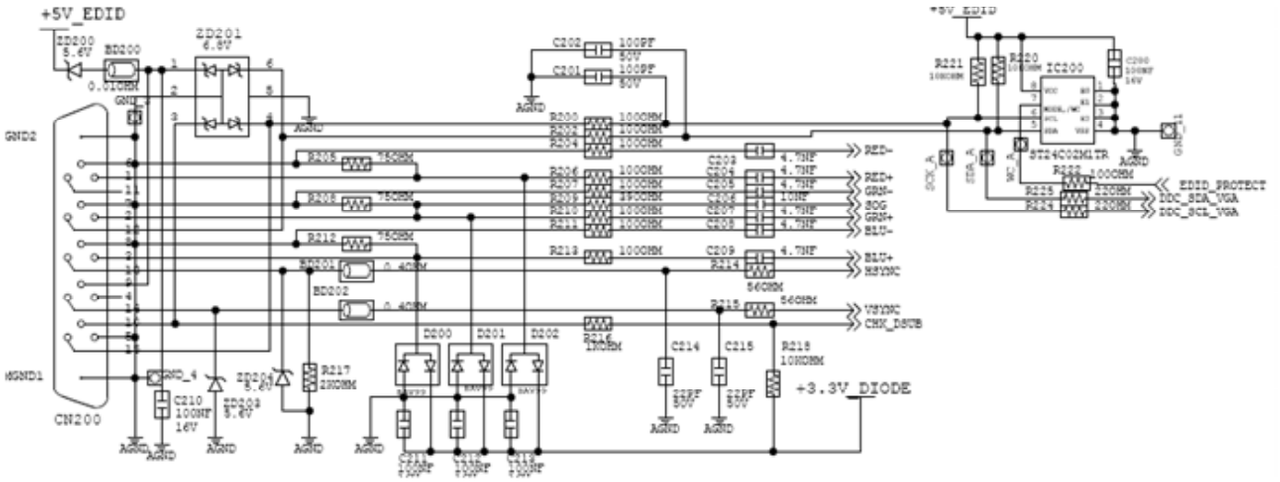


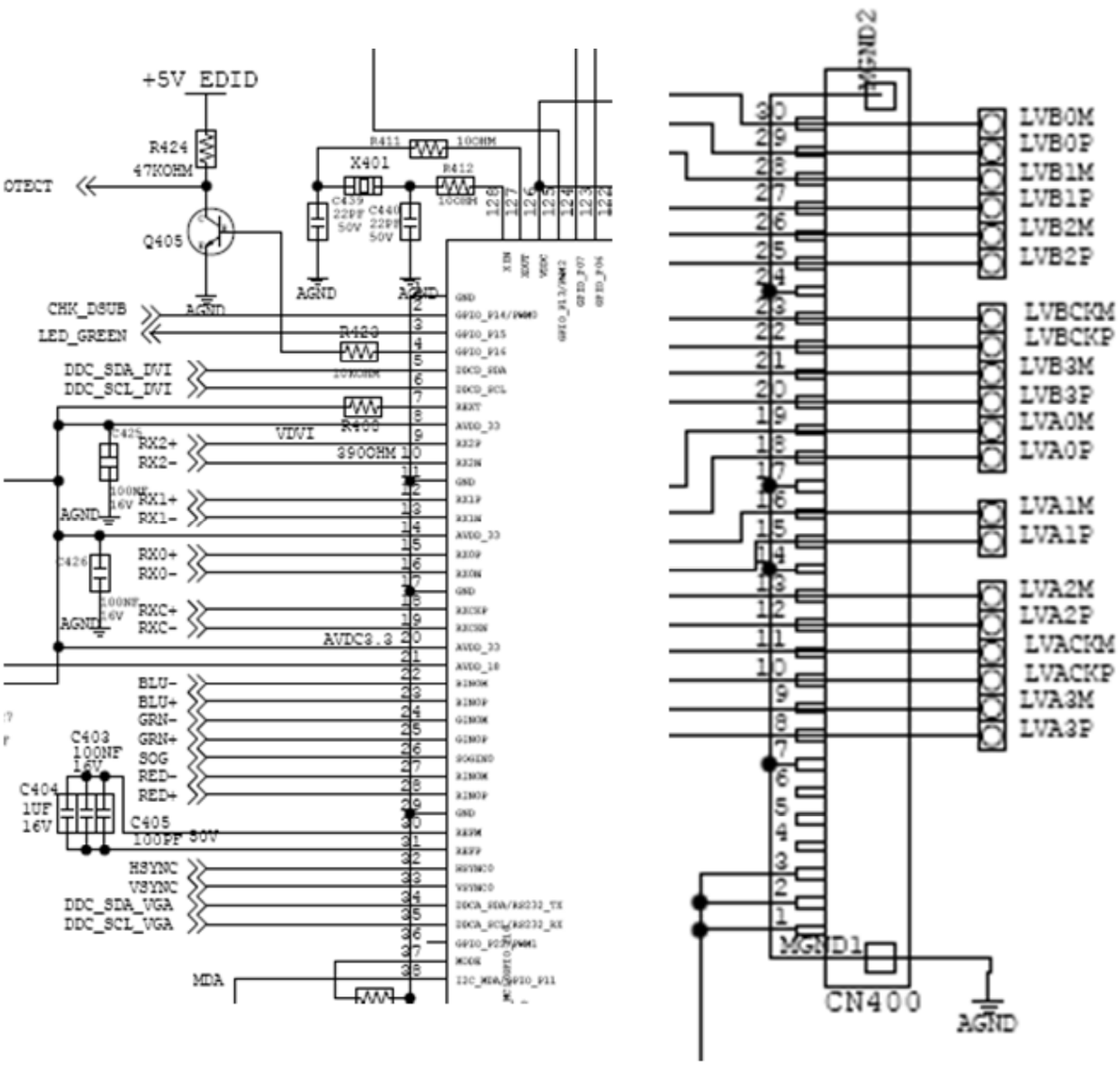


4-3. When the screen is blank (Analog)

Symptom	- LEven though the LED power turns on, the screen is blank when connecting the VGA cable.
Major checkpoints	- Even though the LED power turns on, the screen is blank when connecting the VGA cable. - Check the D-sub cable connections. - Check whether the LVDS cable is connected correctly to the panel. - Check whether the lamp connector of the panel is connected correctly to the IP board.
Diagnostics	 Check the signal cables and their connections. Yes ① Is X401 oscillating correctly? — No → Check and replace the circuits related to X401. Yes ② Do the RGB inputs appear at R206, R210, and R213? — No → Check the R206, R210, and R213 input terminals. Yes Do the ③ Hsync and ④ Vsync waveforms appear at pins 32, 33 of IC400, respectively? — No → Check the circuits related to IC400. Yes Do output signals appear at pins 8 to 30 of CN400? — No → Check the circuits related to CN400. Yes Is DC 5V measured at pins 1, 2, and 3 of the CN400? — No → Check the +5V_Panel signal and the BL_EN signal. Yes Check and replace the panel.
Caution	Make sure to disconnect the power before working on the IP board.

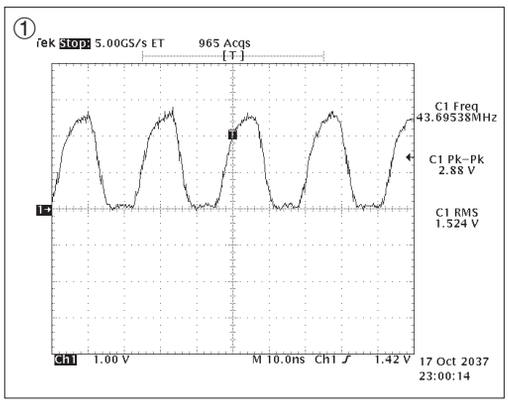
4-3-1. When a blank screen is displayed (Analog)



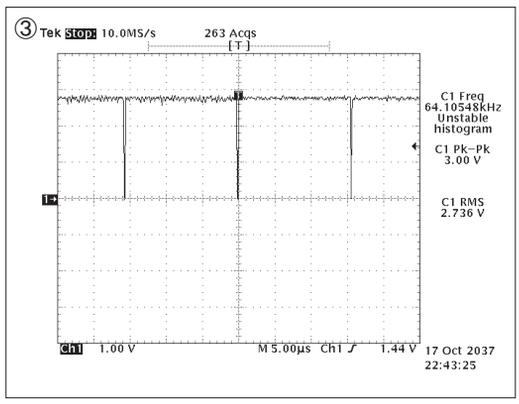


4-3-2. Waveforms when no screen is displayed (Analog)

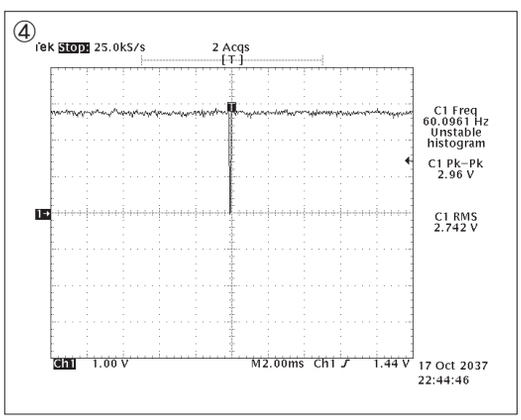
①



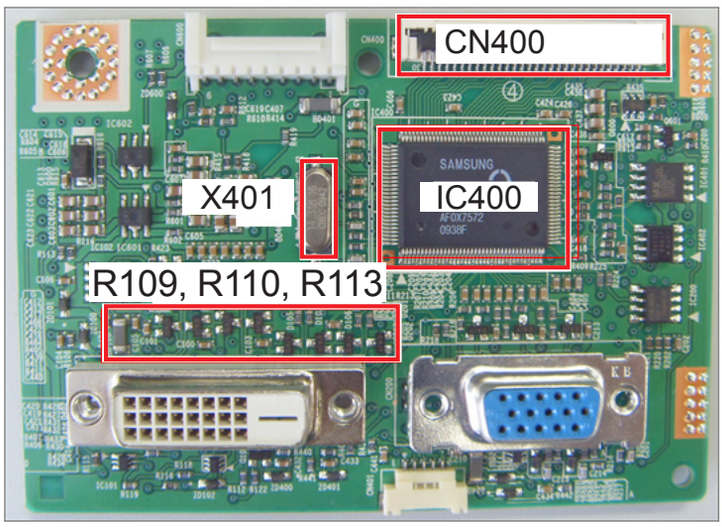
③



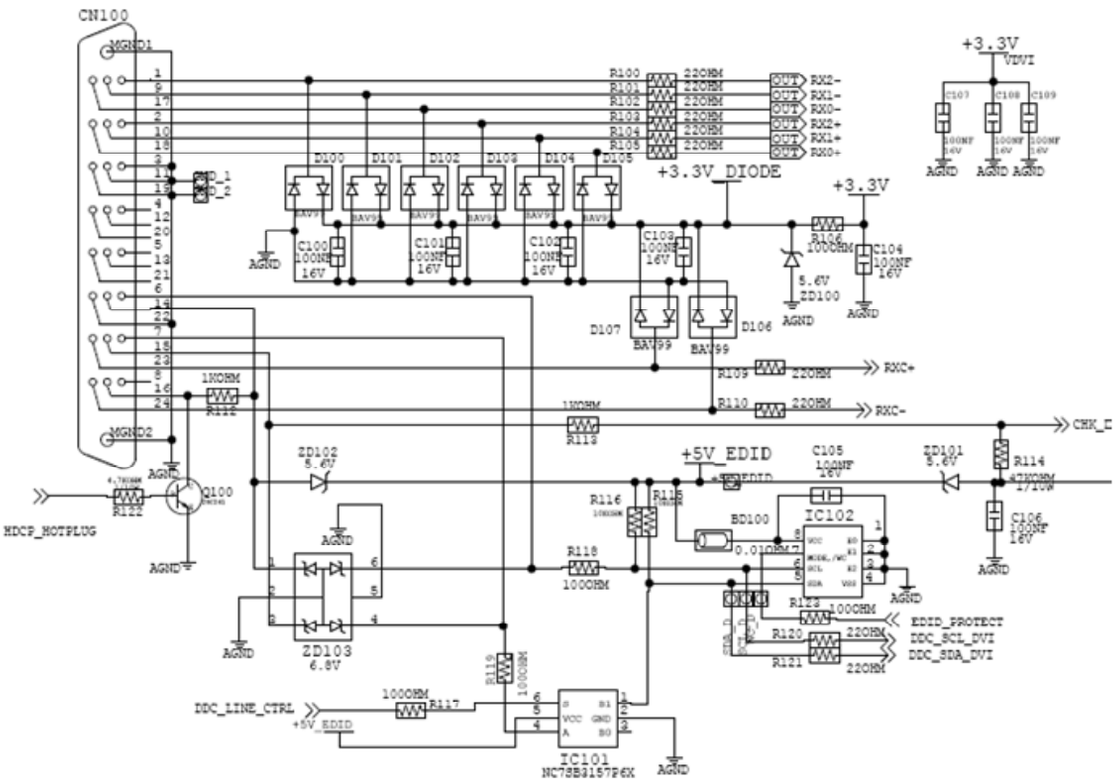
④

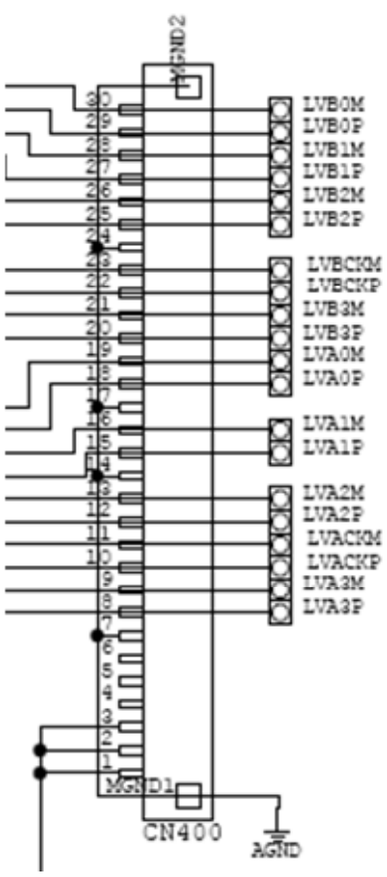


4-4. When a blank screen is displayed (Digital)

Symptom	- Even though the LED power turns on, the screen is blank when connecting the DVI cable.
Major checkpoints	- Even though the LED power turns on, the screen is blank when connecting the DVI cable. - Check the DVI cable connections. - Check whether the LVDS cable is connected correctly to the panel. - Check whether the lamp connector of the panel is connected correctly to the IP board.
Diagnostics	 Check the signal cables and their connections. Yes ① Is X401 oscillating correctly? — No → Check and replace the circuits related to X401. Yes ② Do the inputs appear at R206, R210, and R213? — No → Check the R206, R210, and R213 input terminals. Yes Do output signals appear at pins 8 to 30 of CN400? — No → Check the circuits related to CN400. Yes Can DC 5V be measured at pins 1, 2, and 3 of CN400? — No → Check the Panel EN signal and the BL_EN signal. Yes Check and replace the panel.
Caution	Make sure to disconnect the power before working on the IP board.

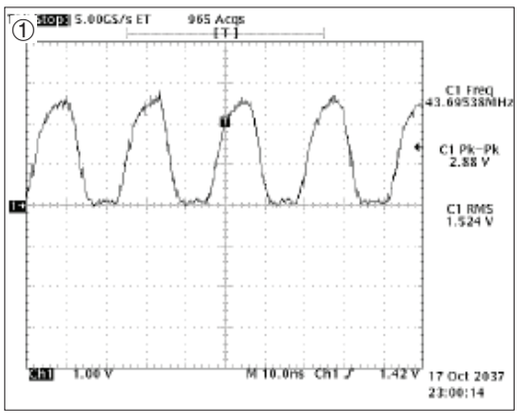
4-4-1. Circuit diagrams when a blank screen is displayed (Digital)



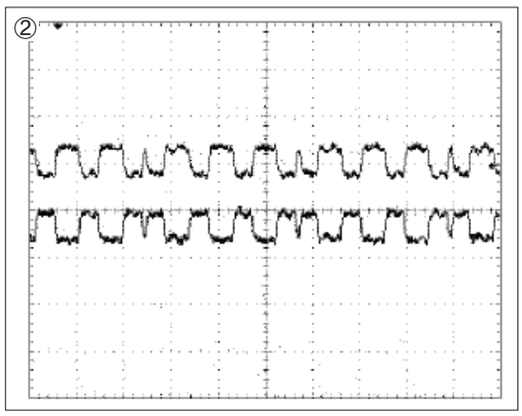


4-4-2. Waveforms when a blank screen is displayed (Digital)

①



②



4-5. Error Examples and Actions

Error Appearance	Symptoms and Actions	Remarks
	Symptom: DVI signals are not recognized. Cause: This error occurs because the PC cannot recognize the mode information since the DVI DDC is not input to the monitor. Action: Input the DVI DDC.	*On how to input DDC, refer to the training manual.
	Symptom: A full white screen is displayed regardless of the signals when turning on the monitor. Cause: This error occurs when only lamp power is supplied and the video signals are not input to the panel due to an LVDS cable connection error. Action: Replace the LVDS cable or connect the cable correctly so that the video signals can be supplied to the panel.	* A Full White pattern is a feature of a TN panel when no video signals are supplied.
	Symptom: When connecting the DVD, noise occurs on the screen. Cause: The HDCP key is not inserted. Action: Enter the HDCP key.	

4-6. Adjustment

4-6-1. Service Adjustment Conditions

1. Precautions before a Service Adjustment
   1) Check whether the devices for the service adjustment are operating normally.
   2) Secure a space that is sufficiently wide for disassembling the monitor.
   3) Prepare a soft mat on which the monitor will be disassembled.

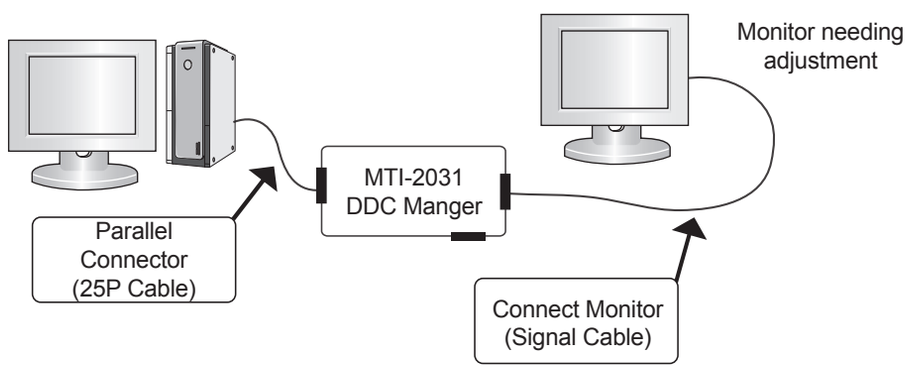
2. Entering Service Mode

   Entering: Menu → Brightness 0 → Contrast 0 → Hold down the Enter button for five (5) seconds.

   Exiting: Power OFF → Power ON

3. Basic Service Items to Perform after Replacing a Board
   1) Check the PC color adjustment status.
   2) Input DDC (input both of Analog and Digital).
   3) Check whether the appropriate MCU code for the model is input.
   4) Hard power the monitor off after entering service mode and performing a reset.

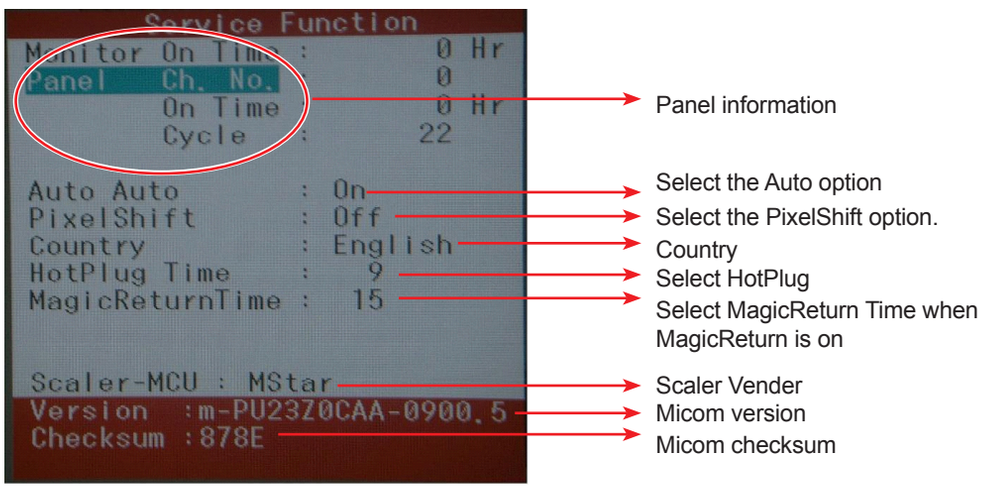
4. DDC EDIT Data Input
   1) Use when updating the AD board code.
   2) Download the WinDDC program, DDC Input program, and Hex and DDC files appropriate to the model through the Quality Control department of Samsung Electronics. Install the jig and input the data, as shown in the figure.



4-6-2. Service Function Specifications

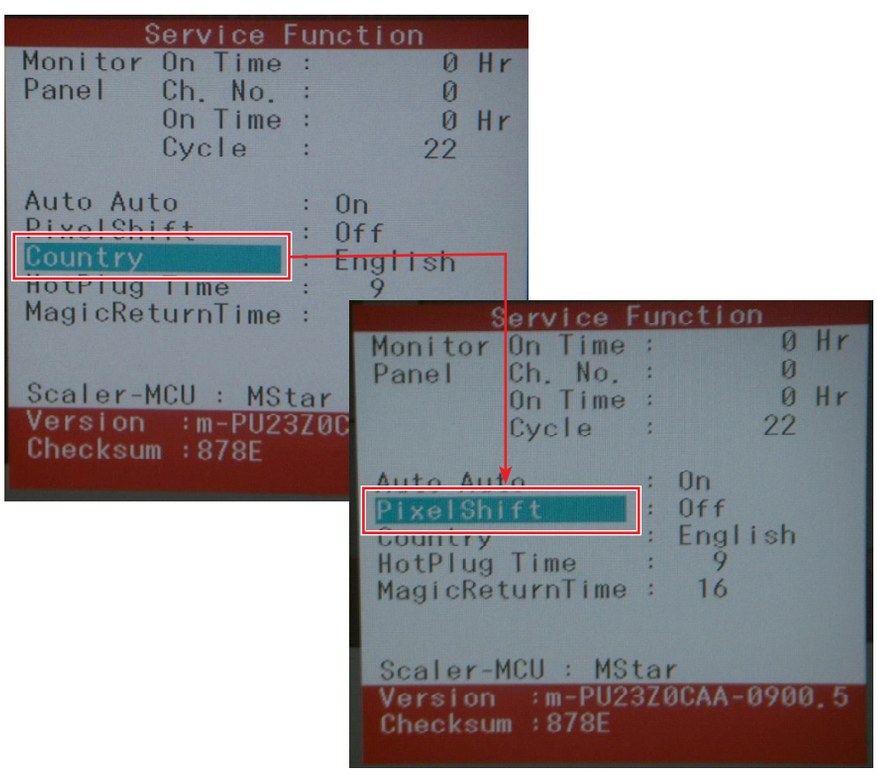
■ Checking the Code Version

1. Check the MCU code version and checksum after entering SVC Mode.
2. Entering SVC Mode
   - Adjust the Brightness and Contrast values to 0.
   - Hold down the Enter button for five (5) seconds.
   - The SVC Function OSD is displayed.
   - To exit the SVC Function, turn the power off.
3. Safe Mode
   - When the input signal is higher than the supported frequency of the product, safe mode gives users some time (one minute) to change the video card settings to the Recommended Mode settings.

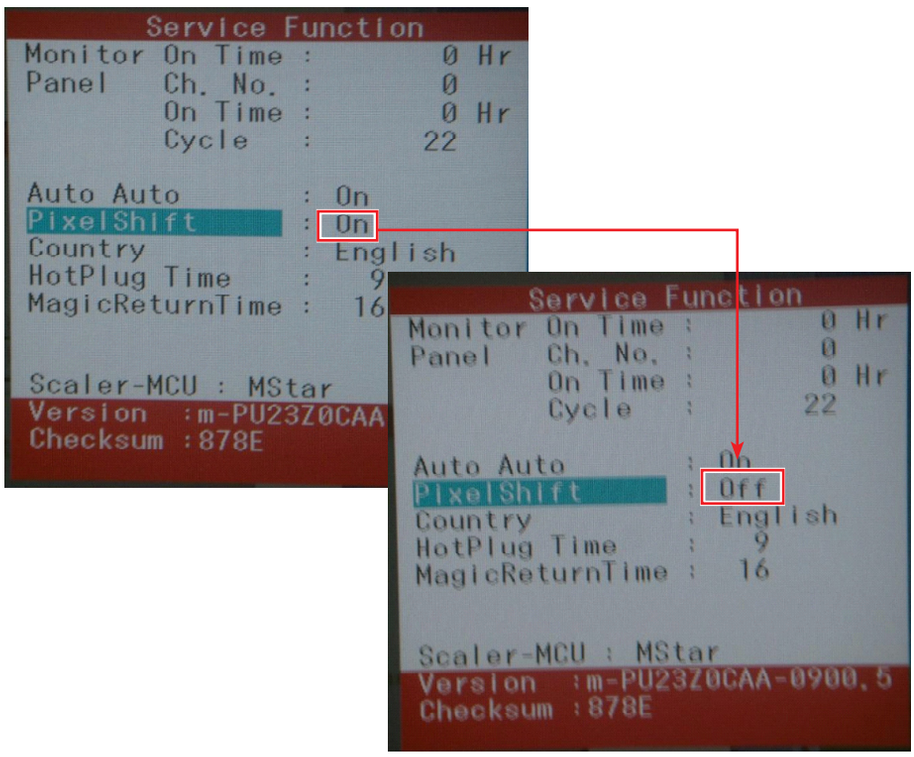


■ Service Mode (Moving around)

1. Press the + button to move to other items.

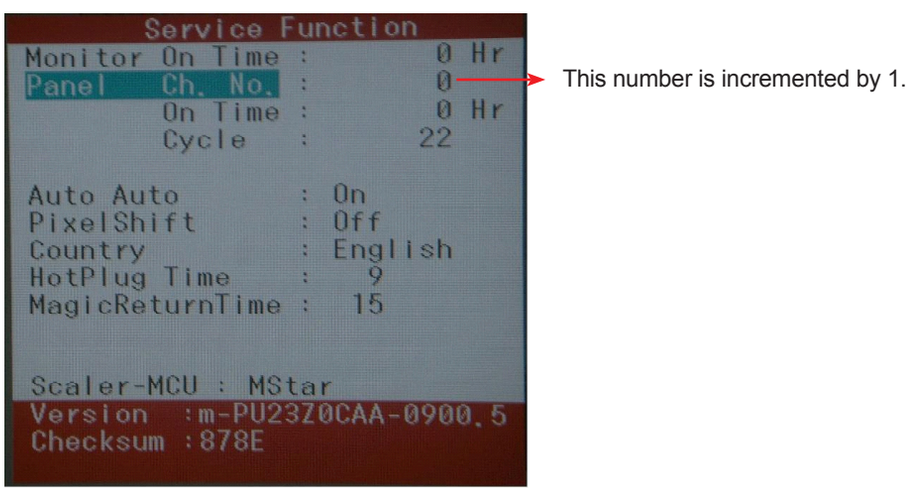


2. Press the - button to change the setting to On or Off.

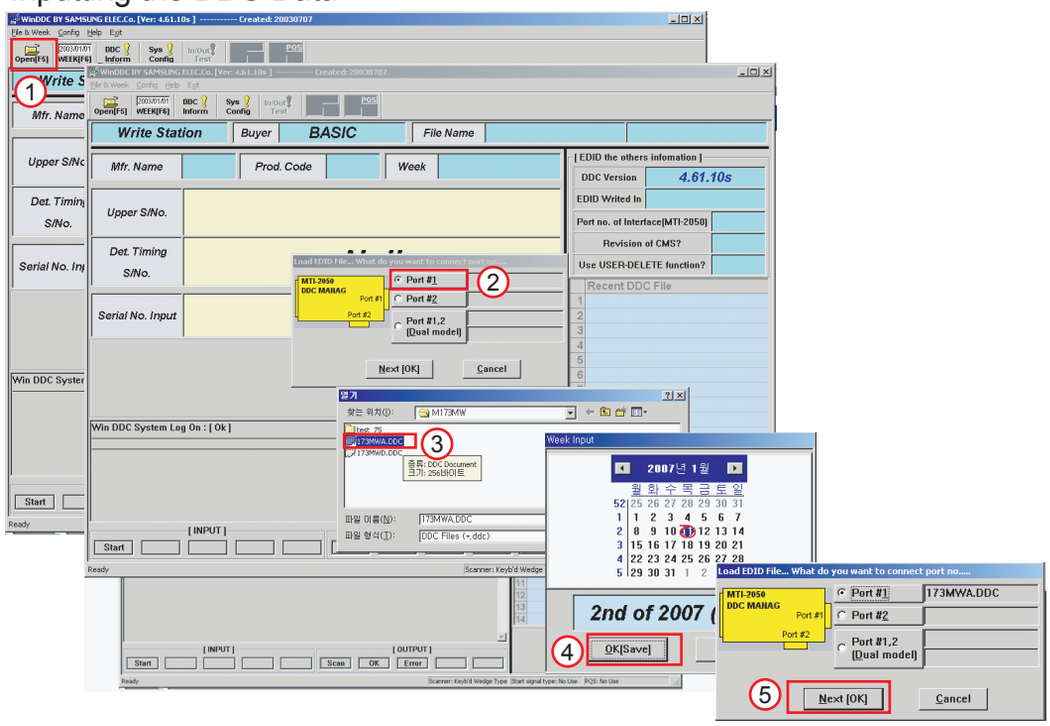


■ When replacing the panel

After replacing the panel, move to the Panel item and hold down the Menu button for five (5) seconds.
The Ch. No is incremented by 1 and then both the On Time and Cycle are set to 0.

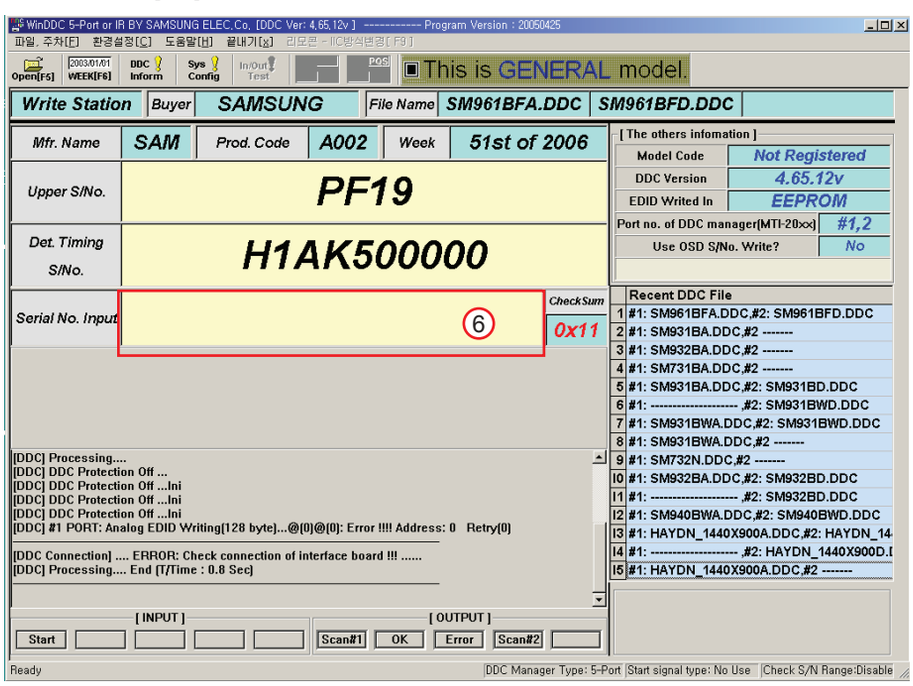


■ Inputting the DDC Data



Use the DDC Manager MTI-2050 version or later.

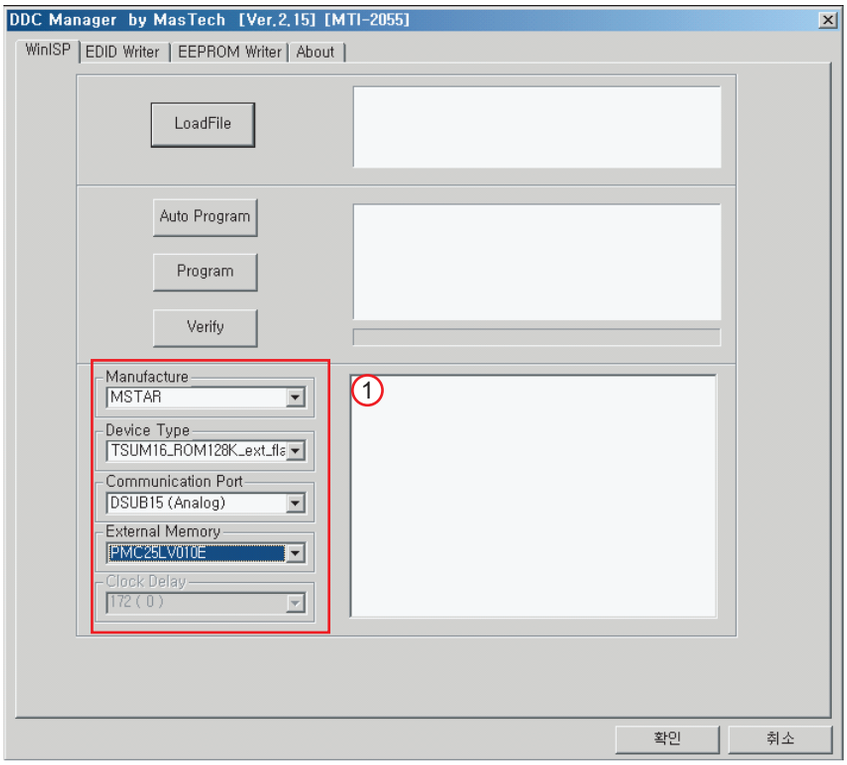
1) Click the Open [F5] icon.
2) Select a port.
3) Open a DDC file.
4) Select a date and click the OK [Save] button.
5) Click the Next [OK] button.



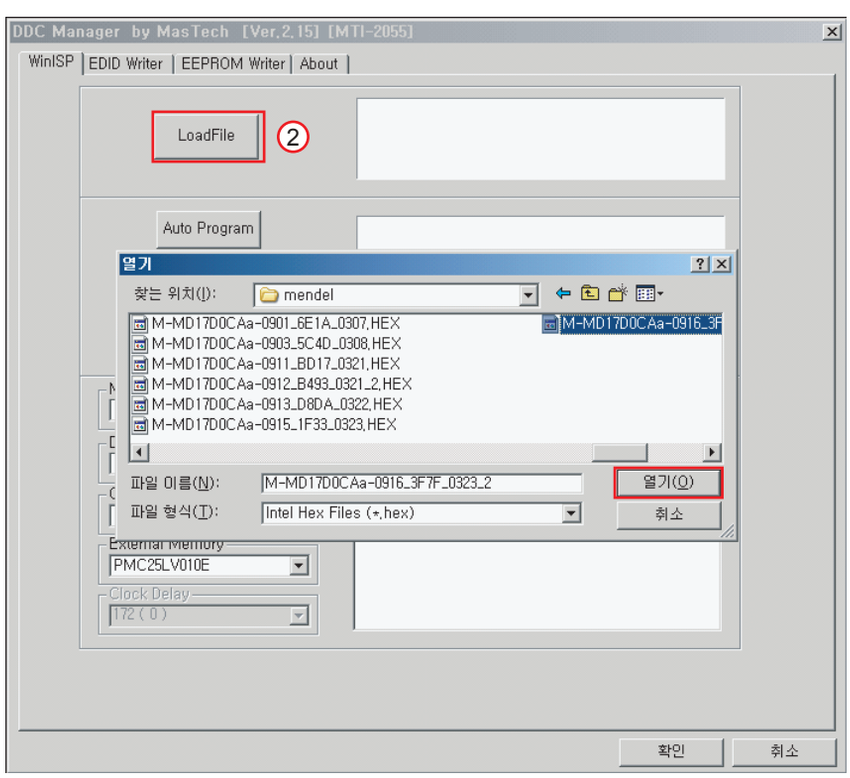
6) Enter the serial number and then press the Enter button

※ When inputting digital data after inputting analog data, repeat steps 2 to 5.

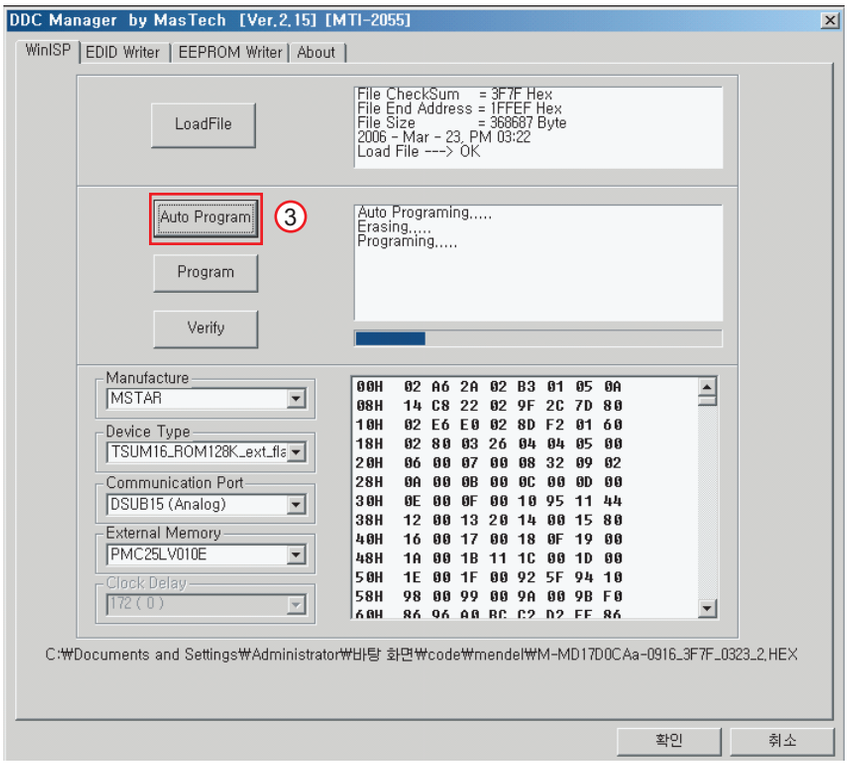
■ Inputting the MCU Data



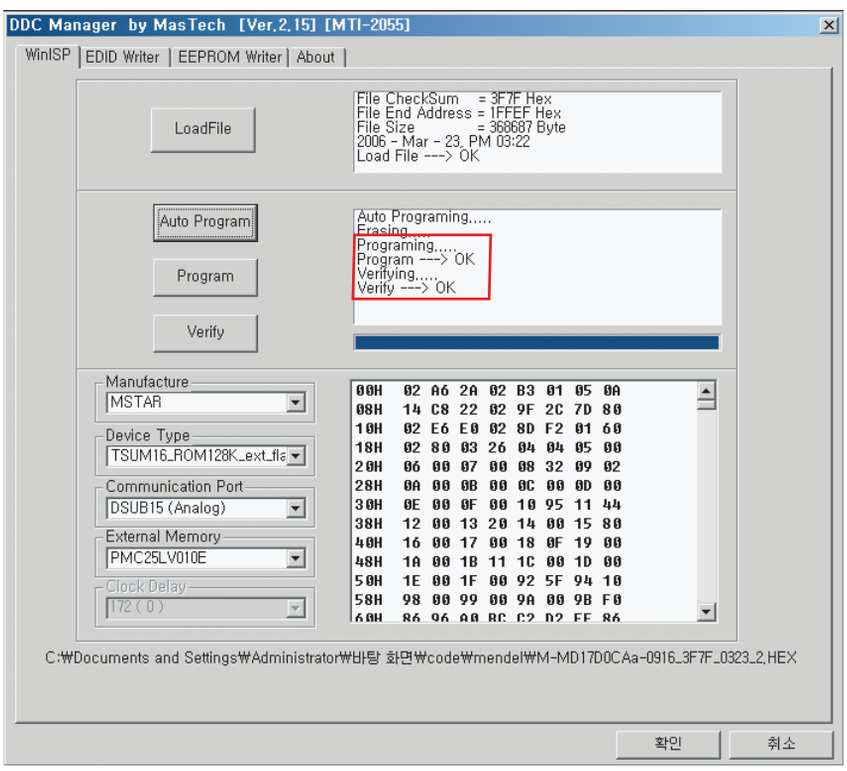
1) Check the following options.
- Manufacture: MSTAR
- Device Type:TSUM16_ROM128K_ext_flash
- Communication Port: DSUB15 (Analog)
- External Memory: PMC25LV010E



2) Click the LoadFile button, select an MCU code file, and then click the Open [O] button.

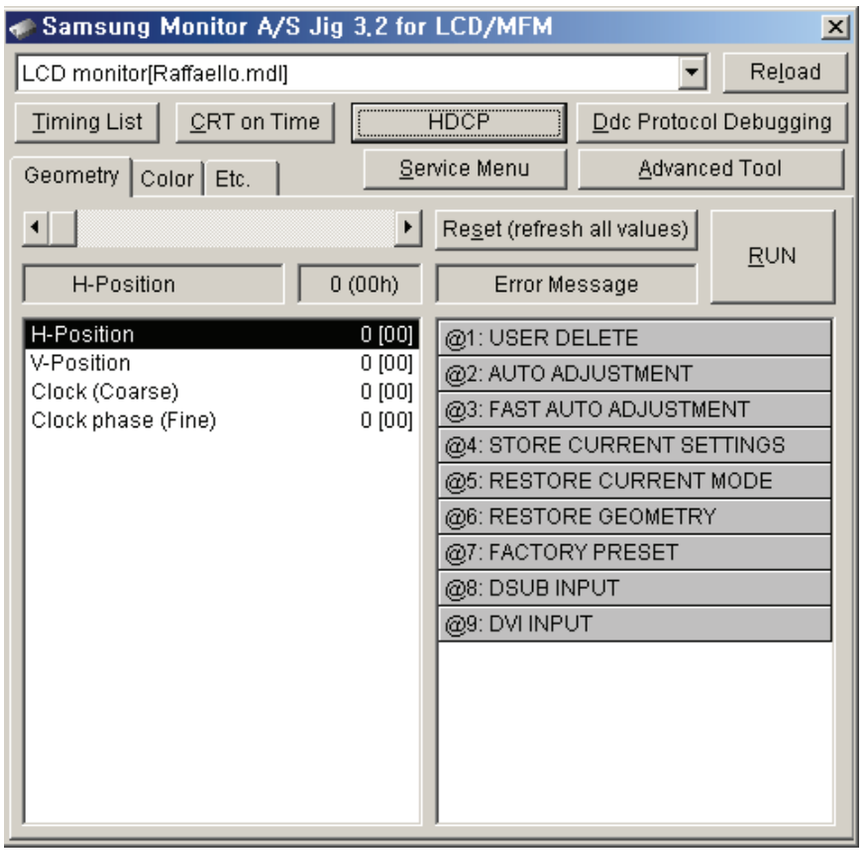

DDC Manager by MasTech [Ver.2.15] [MTI-2055]
WinISP
EDID Writer
EEPROM Writer
About
LoadFile
File CheckSum = 3F7F Hex
File End Address = 1FFEF Hex
File Size = 368687 Byte
2006 - Mar - 23, PM 03:22
Load File ---> OK
Auto Program
3
Program
Verify
Auto Programing.....
Erasing.....
Programing.....
Manufacture
MSTAR
Device Type
TSUM16_ROM128K_ext_fla
Communication Port
DSUB15 (Analog)
External Memory
PMC25LV010E
Clock Delay
172 (0)
00H 02 A6 2A 02 B3 01 05 0A
08H 14 C8 22 02 9F 2C 7D 80
10H 02 E6 E0 02 8D F2 01 60
18H 02 80 03 26 04 04 05 00
20H 06 00 07 00 08 32 09 02
28H 0A 00 0B 00 0C 00 0D 00
30H 0E 00 0F 00 10 95 11 44
38H 12 00 13 20 14 00 15 80
40H 16 00 17 00 18 0F 19 00
48H 1A 00 1B 11 1C 00 1D 00
50H 1E 00 1F 00 92 5F 94 10
58H 98 00 99 00 9A 00 9B F0
C:₩Documents and Settings₩Administrator₩바탕 화면₩code₩mendel₩M-MD17D0CAa-0916_3F7F_0323_2.HEX
확인
취소

3) Click the Auto Program button.

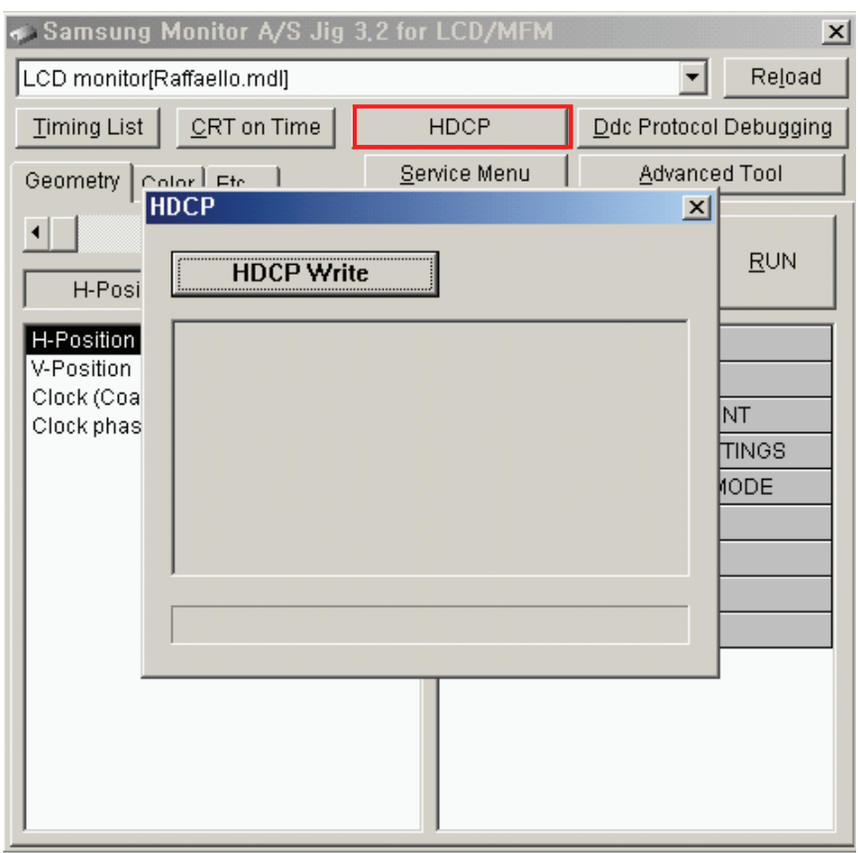

DDC Manager by MasTech [Ver.2.15] [MTI-2055]
WinISP
EDID Writer
EEPROM Writer
About
LoadFile
File CheckSum = 3F7F Hex
File End Address = 1FFEF Hex
File Size = 368687 Byte
2006 - Mar - 23, PM 03:22
Load File ---> OK
Auto Program
Program
Verify
Auto Programing.....
Erasing.....
Programing.....
Program ---> OK
Verifying.....
Verify ---> OK
Manufacture
MSTAR
Device Type
TSUM16_ROM128K_ext_fla
Communication Port
DSUB15 (Analog)
External Memory
PMC25LV010E
Clock Delay
172 (0)
00H 02 A6 2A 02 B3 01 05 0A
08H 14 C8 22 02 9F 2C 7D 80
10H 02 E6 E0 02 8D F2 01 60
18H 02 80 03 26 04 04 05 00
20H 06 00 07 00 08 32 09 02
28H 0A 00 0B 00 0C 00 0D 00
30H 0E 00 0F 00 10 95 11 44
38H 12 00 13 20 14 00 15 80
40H 16 00 17 00 18 0F 19 00
48H 1A 00 1B 11 1C 00 1D 00
50H 1E 00 1F 00 92 5F 94 10
58H 98 00 99 00 9A 00 9B F0
C:₩Documents and Settings₩Administrator₩바탕 화면₩code₩mendel₩M-MD17D0CAa-0916_3F7F_0323_2.HEX
확인
취소

4) When programming and verification are complete, hard power the monitor off and then on again.

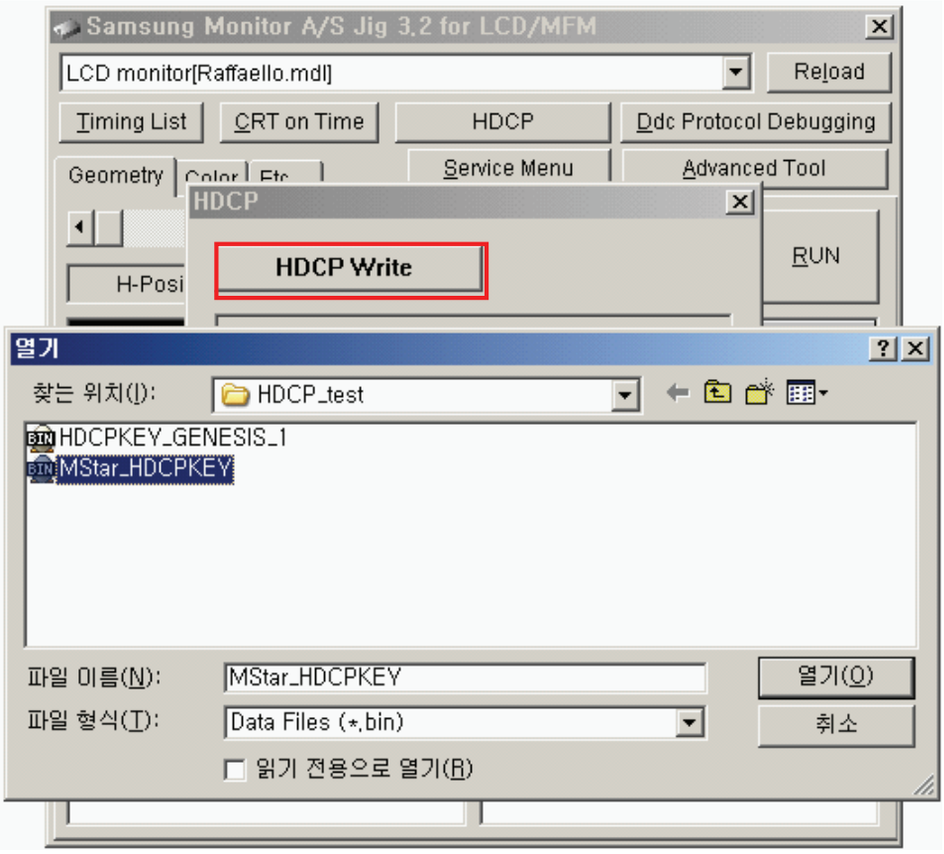
■ Inputting the Code (HDCP)



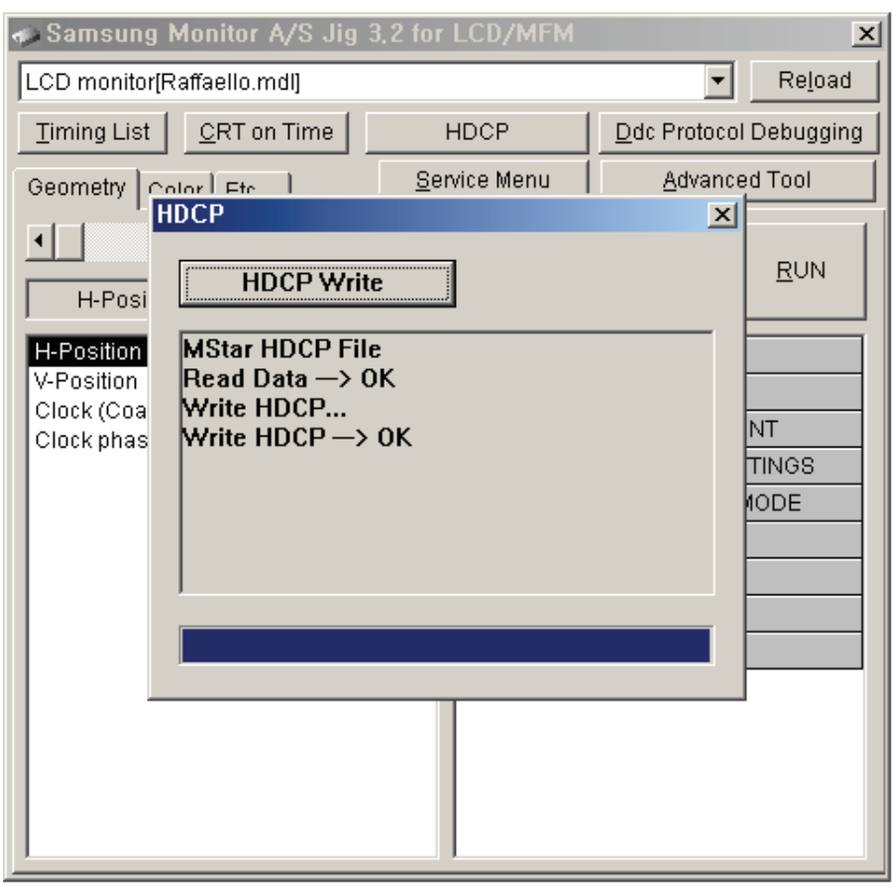
1. Run the service.exe file.



2. Click the HDCP button.



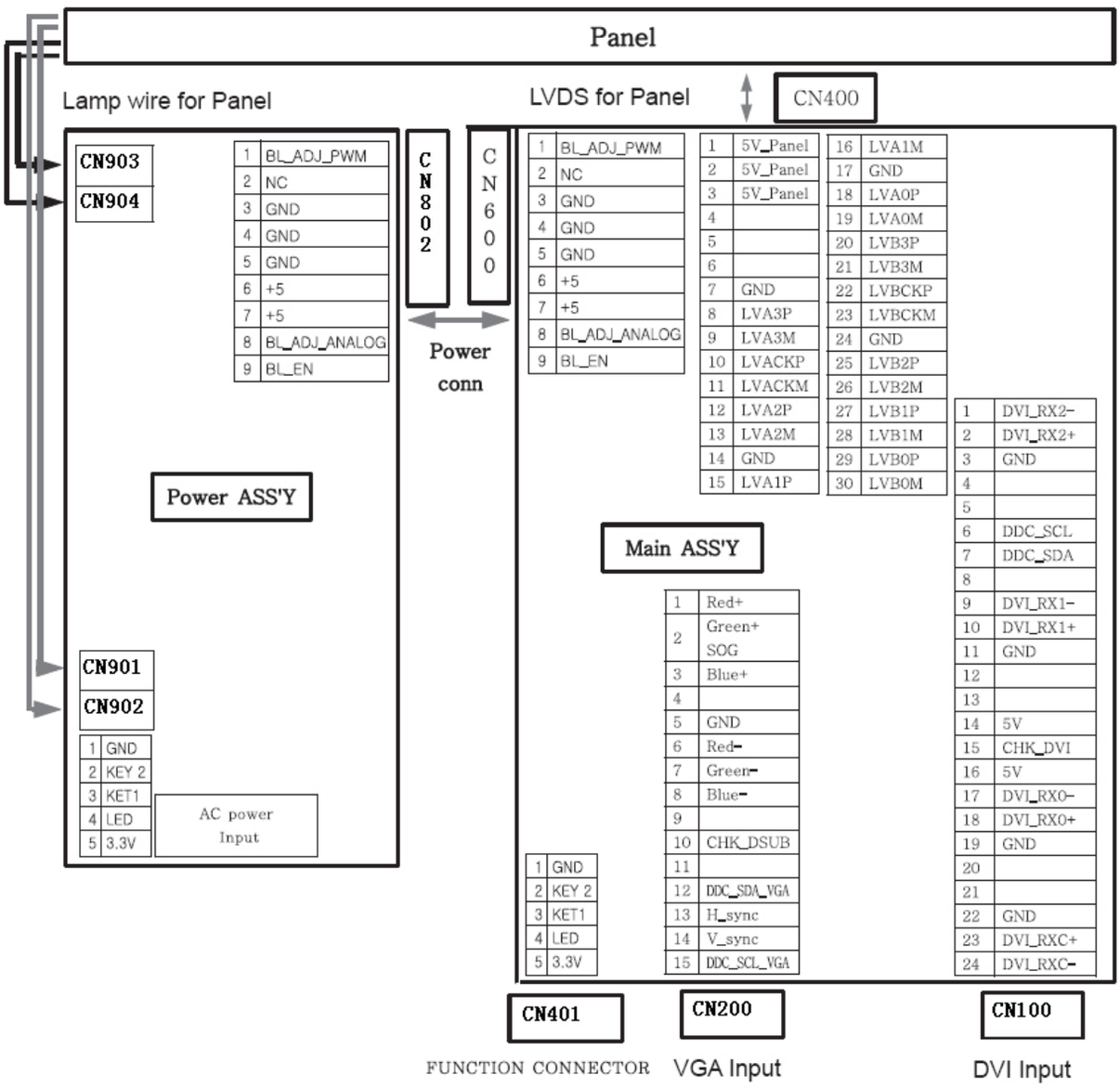
3. Click the HDCP Write button and select MStar_HDCPKEY.



4. Inputting the HDCP key is completed.

6. Wiring Diagram

6-1. Wiring Diagram - Main Board



1	BL_ADJ_PWM
2	NC
3	GND
4	GND
5	GND
6	+5
7	+5
8	BL_ADJ_ANALOG
9	BL_EN

1	BL_ADJ_PWM
2	NC
3	GND
4	GND
5	GND
6	+5
7	+5
8	BL_ADJ_ANALOG
9	BL_EN

1	5V_Panel	16	LVA1M	1	DVI_RX2-
2	5V_Panel	17	GND	2	DVI_RX2+
3	5V_Panel	18	LVA0P	3	GND
4		19	LVA0M	4	
5		20	LVB3P	5	
6		21	LVB3M	6	DDC_SCL
7	GND	22	LVBCKP	7	DDC_SDA
8	LVA3P	23	LVBCKM	8	
9	LVA3M	24	GND	9	DVI_RX1-
10	LVACKP	25	LVB2P	10	DVI_RX1+
11	LVACKM	26	LVB2M	11	GND
12	LVA2P	27	LVB1P	12	
13	LVA2M	28	LVB1M	13	
14	GND	29	LVB0P	14	5V
15	LVA1P	30	LVB0M	15	CHK_DVI
				16	5V
				17	DVI_RX0-
				18	DVI_RX0+
				19	GND
				20	
				21	
				22	GND
				23	DVI_RXC+
				24	DVI_RXC-

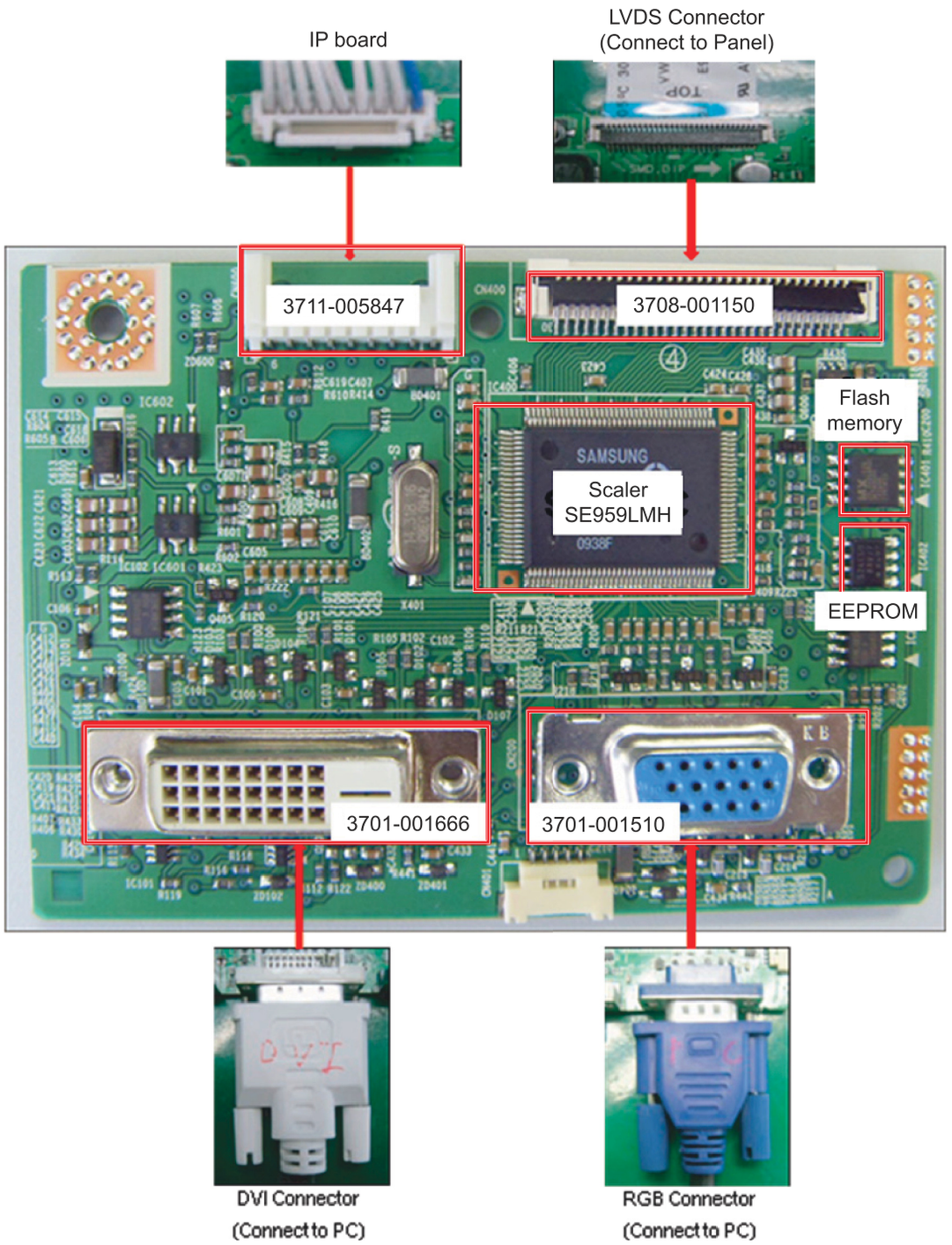
1	GND
2	KEY 2
3	KET1
4	LED
5	3.3V

1	Red+
2	Green+ SOG
3	Blue+
4	
5	GND
6	Red-
7	Green-
8	Blue-
9	
10	CHK_DSUB
11	
12	DDC_SDA_VGA
13	H_sync
14	V_sync
15	DDC_SCL_VGA

1	GND
2	KEY 2
3	KET1
4	LED
5	3.3V

1	GND
2	KEY 2
3	KET1
4	LED
5	3.3V

6-2. Wiring Diagram - IP Board



6-3. Connector Functions

Connector	Functions
CN101 ↔ CN600	Supplies 5V from the power board to the main board and transmits the PWM output from the power board to the inverter. *When a problem occurs: The No Power and Blank Screen errors may occur.
CN1 ~ CN4 In	Transmits the lamp current (6mA ~ 7mA) generated in the inverter to the lamp of the panel. * When a problem occurs: The Blank Screen error may occur.
CN102	Transmits the input power of 90 to 263V to the power board. * When a problem occurs: The No Power error may occur.
CN101	Connects the function board. * When a problem occurs: The No LED screen and Function failure errors may occur.
CN102	VGA signal input terminal * When a problem occurs: The No RGB output error may occur.
CN400	Transmits the LVDS signals from the main board to the panel. * When a problem occurs: The Blank screen and No Power errors may occur.

6-4. Cables

Use	LVDS 30P FFC cable
Code	BN96-02854Y
Photo	

Memo